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INDEX TO CONTENTS, PAGE 256.

ADVERTISERS' INDEX, PAGE 26.

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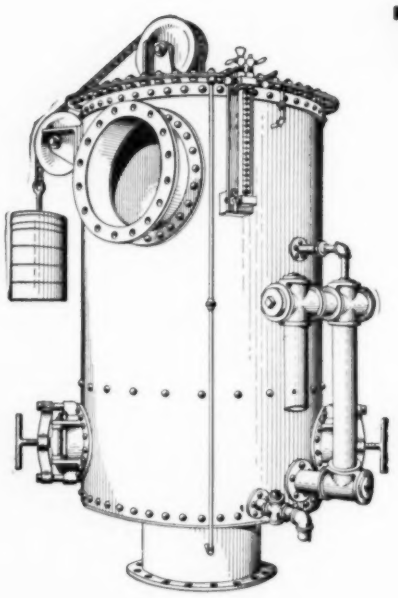

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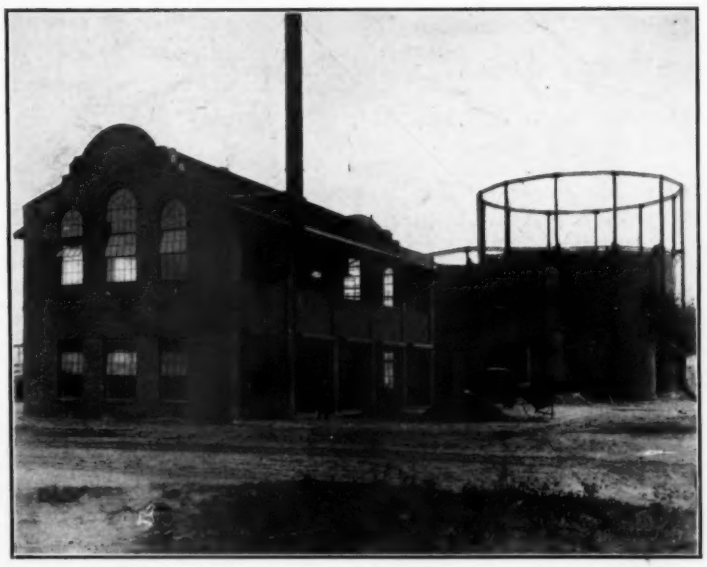
THE ST. PETERSBURG, FLORIDA, GAS PLANT.

The gas plant built for the city of St. Petersburg, Fla., has been operating about 3 months, and on March 1st, 1915, was supplying gas to 506 consumers. The works was designed and engineered for the city by J. B. McCrary Company, Engineers, Atlanta, Ga., and the water gas generating apparatus and equipment was installed by the Gas Engineering Company, Trenton, N. J.

The plant has a generating capacity of 600,000 cubic feet of gas per 24 hours, and is equipped with all the latest improvements. The generators are in duplicate, with reverse steam connections for making up and down runs, and blowers located on the operating floor are driven by direct connected steam turbines. The steam plant consists of two Manning boilers each 85-horse power, equipped with duplicate boiler feed pump, and supplied with hot water through a feed water heater. The gas passes from the generators through two scrubbers, and then into a 25,000 cubic foot relief holder. From there it is taken by the exhauster and pumped through a tar extractor, condenser, shaving scrubber, purifiers, and station meter into the 150,000 cubic foot storage holder. All of the apparatus throughout the plant is connected by 12″ yard connections, inlet and outlet valves and by-pass valves, so that anyone of them can be cut out without shutting down the plant.



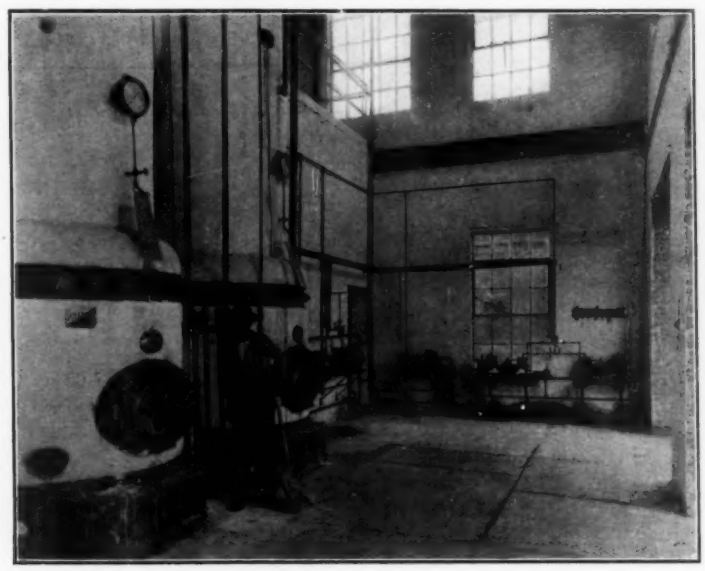
General View of Plant.

The generator house is a steel frame structure enclosed with brick, with a concrete roof, steel operating floor, steel window frames, and steel sliding shutters on the side openings, thus making it an absolutely fire proof structure.

The side openings both first and second floors have steel rolling shutters that can be opened wide, this giving in that climate a building that will be cool in the summer and so arranged that the gas-maker working on the operating floor, has an unobstructed view of the whole plant. Inside of the building is a Ridgway Steam Hydraulic elevator for elevating the coal or coke to the operating or charging floor for the generators.

The outlet of the storage holder is connected to a 12″ governor, to regulate the gas pressure on tbe distributing system of the city. This main system consists of about 19 miles of cast iron mains starting from the works with a 12″ inch main, and with three cross trunk lines of 8″ inch and 6″ pipe, these supplying the 4″

Generator Floor : Turbine Blower in Background.

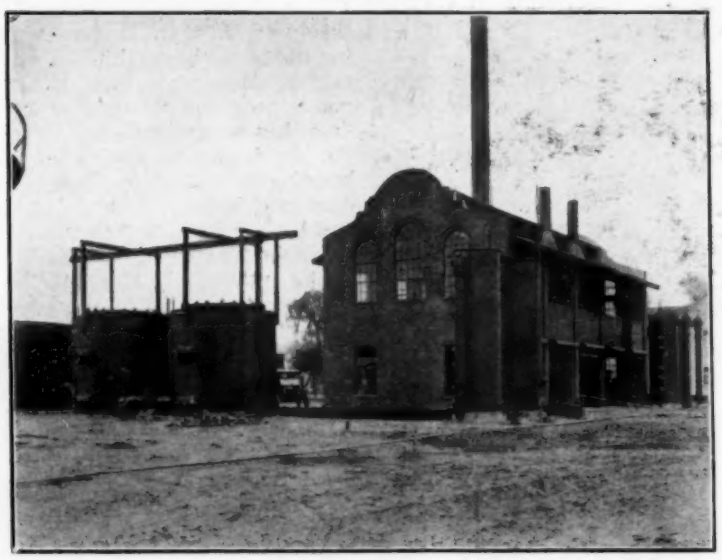


Steam Plant : Manning Vertical Boilers.

mains which are all laid in the alleys of the city. The services to the houses are brought in from the rear, making it unnecessary to tear up the paved streets, or deface the front yards in putting them in.

Station Meter and Exhauster.—Rolling Steel Doors.

The construction of the plant was begun about July 1st, 1914, and gas was first turned on the city November 28th, 1914. Since that time, about three and one-half million cubic feet of gas have been manufactured and sent out to consumers, nearly all of it being used on gas ranges, water heaters and heating stoves. The price of



The Outdoor Purifying Boxes.

gas is $1.25 per 1,000 cubic feet, a price as low, if not lower than any other city in Florida. It is estimated that by the end of the present year, the plant will be on a paying basis, as the consumption of gas for the month of February was 1,500,000 cubic feet, and will probably be more than 2,000,000 cubic feet for March.

The receipts from gas sales for February were $1,920.45.

Electric Cooking in Apartment Houses.

In view of the success attained with all-electric cooking in a large apartment house on Irving street, Worcester, Mass., built by the Colonial Real Estate Company of that city, it will equip a new 18 suite apartment now under construction with electric ranges. As in the Irving street property, no coal ranges will be provided and service will be supplied through a separate meter at a rate of from 3 cents to 4 cents per kw.-hr. In the first building the monthly cost of energy for domestic cooking has averaged from $2.50 to $3 per family, three persons constituting the average household.

Lead Wool as Jointing Material.

[From a paper read by C. E. REINICKER before the Illinois Gas Association.]

The question of an efficient jointing material for bell and spigot pipe has caused much discussion among gas engineers in the past, and has not yet been definitely decided. This article is not intended as an argument in favor of lead wool as opposed to other materials, but it is a statement of the causes that lead the Peoples Gas Light and Coke Company of Chicago to adopt lead wool for their large main work. The installation of a 36-inch main will be described to illustrate the present practice of this company.

Germany is the pioneer in the use of lead wool, since in May, 1904, August Bühne, of Freiburg, began to supply the gas companies of that country with "blei-woole." Quick to realize its advantages, operators adopted it to a great extent and its use spread to other countries. In a short time it was protected by over 43 patents in all civilized countries, the first filed in Washington by Frederick Bühne, June 15, 1904. A plant for the manufacture of lead wool was started in Snodland, England, by The Lead Wool Company, and its commercial introduction into America was undertaken by the New York Lead Wool Company, although previous to this time the late C. C. Simpson of New York imported some for the Consolidated Gas Company.

The first consignment of lead wool for the Peoples Gas Light and Coke Company reached Chicago in August, 1906, 100 pounds from the New York Lead Wool Company. The following year several small lots were purchased for experimental purposes, and in that Fall its use was undertaken in the installation of the piping for the exhauster house of the 22nd Street station. Following this it was used in other plants of the property. The work was done by hand caulking, the small number of joints on each individual installation making the excess cost less conspicuous. In 1909 the first street main was laid with lead wool joints, a 12-inch line in Belmont Ave. in the West Division. In 1910 a 6-inch main was laid in 118th Street, in the Calumet Division, both hand caulked. We had experimented with pneumatic caulking in 1908, but because of the crudeness of the apparatus, unfamiliarity with the process, some prejudice on the part of the operators and also since the joints were cast lead the method proved unsatisfactory.

During the interval from 1907 to 1911, between 200 and 300 lead wool joints of all sizes, and operating under all conditions of temperature and vibration were installed in manufacturing plants and exhauster houses. In July, 1911, the writer made a systematic examination of 202 exposed joints, ranging in size from 12-inch to 36-inch, most of them from 24-inch to 36-inch. None were leaking gas or condensation; on the face of the lead of 8 there were small globules of tar; 4 showed a slight seepage of oil. On a percentage basis only 5.9% were other than "bottle tight." Truly, a remarkable record, since not exceeding 20 had been recaulked or refaced since they were installed.

Especial mention should be made of one joint that was not leaking. It was on a 30-inch outlet to a set of condensers, and in the vertical plain, the face of the bell about 6 inches from a brick wall. The temperature of the gas is about 175°, and the pressure ranges from 4 to 5 inches; this temperature causing expansion to such an extent that the lead protruded from the joint about one-half inch. This, no doubt, resulted from the fact that the bell pipe was held rigidly by the wall, the spigot pipe moving the joint. The joint was hand caulked, and because of the semi-darkness of the basement may not have been sufficiently sledged.

Between 1907 and 1911 The People's Company had been converting its distribution system from straight low pressure to a combined feeder line low pressure system; the gas transferred from the former to the latter lines by 12-inch governors. This necessitated the converting of many existing mains and the laying of new lines, 24-inch, 20-inch and 16-inch. The converted mains were all carefully overhauled before they were used as feeder lines.

Both the converted and new mains had cast lead joints, except that in 1911 2½ miles of 24-inch cement joints were installed. All new mains were tested with 16 pounds air pressure, and the joints carefully gone over with soap and water, being absolutely tight before the trench was back filled. Notwithstanding all precautions, a great many of the joints of both kinds failed to stand 5 pounds of gas pressure, necessitating continuous overhauling.

The problem of electrolysis had also to be solved, and again there seemed to be no agreement among gas engineers. While the question was being considered, great trouble was experienced in both lead and cement jointed mains, particularly in the neighborhood of power houses. The metal to metal contact which may have existed

when the main was laid was disturbed by vibration or other cause, and each joint was affected, which resulted in a weakening at that point. This could only be prevented by bonding wires at each joint.

With the approach of 1912 it became evident that it would be necessary to lay a 36-inch main from the Ninety-sixth street Station to South Station at Twenty-fifth and Throop streets, a distance of 13.3 miles. After the route was selected, the next problem was selecting suitable jointing material. In view of the poor records of cast lead and cement, it was evident that a different material was necessary, and it was deemed advisable to conduct a series of tests embracing mechanical and electrolytical features. These tests will be briefly reviewed since they had a direct bearing on the reasons for the use of lead wool.

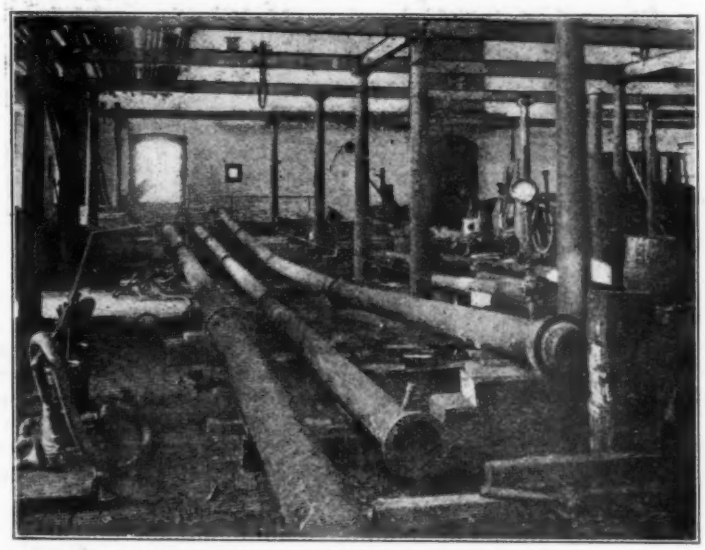


Fig. 1.—Testing Joints.

The tests were conducted during the winter in an unheated building; the pipe used 6-inch, since it allowed of easy handling. Four parallel lines of four lengths were laid, carefully blocked before and behind each joint and wedged to prevent lateral movement during calking. This permitted a study of 5 joints on each line, including those at the ends. A $1\frac{1}{4}$-inch manifold was connected to the middle of each line, cocks isolating each set of pipes. Attached to one end of this manifold was a small gas fired steam boiler and to the other was attached an air pump.

With this equipment it was possible to raise the temperature of the lines by admitting steam. A range from 20° to 120° was used, thermometers being fastened to the exterior of the pipes and insulated from the surrounding air. The ends of the lines were braced to prevent longitudinal movement, since lateral motion or arching of the pipes would be more severe on the joints.

Each joint was laid up with a different material, including those commercially used and some suggested as a means of eliminating the trouble. The joints were made with extreme care, every precaution being taken to insure perfect mechanical operation, and under an air pressure of 20 pounds each was absolutely tight. Resistance measurements, to determine the drop across each joint, were then taken, after which steam was admitted into the lines, the temperature raised and the pipes allowed to expand. After reaching 120° the steam was shut off and the pipes allowed to cool to the temperature of starting. Resistence measurements were then taken over the joints, and the lines again put under pressure of 20 pounds. This cycle of tests was repeated twice, after which a comparison of the joints was made.

After eliminating those which did not come up to requirements from a mechanical or electrolytical standpoint each line was equipped with one kind of jointing material, the kind of yarn being the only variation in each set. The same method of testing was then carried out with 15 pounds air pressure, the usual service test. After this series of tests, the line with lead wool was the only one in which a majority of the joints were "bottle tight." On this line four of the five joints were tight, the cap on the end leaking. From the resistance measurements of the joints it was demonstrated that this material was by far the most satisfactory from an electrolytical standpoint. During the tests the line had repeatedly arched, at times raising seven-eights of an inch off of the blocks. A consecutive record of this line is as follows:

Ref. Mark.	Kind of Joint.	Res. of newly made joints.	Equiv. res feet C. I. main.	Joints under 15 lbs. air.
C2 1	2''D.Y.1''L.W.	.0001140	2.6	Tight
2	3''T.Y.1S.D.Y.1''L.W	.0000903	2.1	Tight
3	3''D.Y.1''L.W.	.0000667	1.5	Tight
4	3'' T.Y.1 S.D.Y.1''L.W	.0000895	2.1	Tight
5	2''D.Y.1''L.W	.0001490	3.5	Tight

1st test.	Res. of joints heated to 120° cooled to 20°.	Equiv. res feet C. I. main	Cond. under 15 lbs air.
1	.0000883	2.0	Tight
2	.0000764	1.8	Tight
3	.0000727	1.7	Tight
4	.0000717	1.6	Tight
5	.0001395	3.2	S.L. at Bell
2d test.			
1	.0001150	2.6	Tight
2	.0000805	1.8	Tight
3	.0000800	1.8	Tight
4	.0001080	2.5	Tight
5	.0001390	3.2	S.L. at Bell

3d test.				Per cent. inc in res.
1	.000113	2.6	Tight	0
2	.000098	2.2	Tight	4.8
3	.000105	2.4	Tight	60.0
4	.000108	2.5	Tight	16.0
5	.000158	3.6	B.L. at Bell	5.9

NOTE.—D.Y.—Dry Yarn. L.W.—Lead Wool. T.Y.—Tarred Yarn. 1 S.D.Y.—1 Strand Dry Yarn. S.L.—Slight Leak. B.L.—Bad Leak.

After the leaking joints were recalked, as a further test of this line it was subjected to deflection and vibration. When the deflection of the center joint was 5 inches two of the three center joints showed slight leakage. When a continuous downward push had deflected the centre joint 12 inches, all trace of leakage disappeared from one of the affected joints, and the other was negligible. The line was then raised to its original position, twice deflected and vibrated, the last being a sheer drop from its original position; two of the three joints were still tight, one of them, that in the center of the line, at the point of greatest deflection, 12 inches.

During these movements of the line air pressure of $15\frac{1}{2}$ pounds was constantly maintained. The line was allowed to stand deflected for 24 hours, and the gauge registered $14\frac{3}{4}$ lbs. This condition is shown in Fig. 1. It was then determined to further investigate the joint at the point of maximum deflection, so the lead wool was picked out, the yarn still holding tight. After vibrating the line, however, the joint "broke down" and leaked badly. This proves an important point, that the yarn holds the pressure, the caulking material merely acting to keep the yarn compressed.

If the yarn is driven into the joint firmly and carefully, and if a material is found that will hold the yarn in shape and prevent its loosening, the joint will withstand a great deal of hard usage without developing a leak. Lead wool seems to fulfil this because it is calked strand by strand, from where it is in contact with the yarn to the face of the bell. It is introduced into the joint cold and when calked occupies the entire space. Cast lead is poured into the joint hot, a certain time elapses before it is calked and it contracts. The inside edge of the lead is irregular; at the bottom of the joint it is in contact with the yarn, but at the top it is not always. During calking the face of the lead is driven to fill the space, but the effect of the heaviest sledging or pneumatic hammers does not extend more than three-fourths of an inch in from the face of the lead, and there remains a large body of metal that fulfills no useful purpose; and a very slight movement of the line disturbs the joint, loosens the yarn and in a short time a leak develops.

These tests showed distinctly the superiority of lead wool over other materials, both from a mechanical and electrolytic standpoint. And since the lead wool joints in the plants were giving such satisfaction, it was decided to use it for the large mains until it failed to develop efficiency or some better material or a better type of joint was discovered.

With the material decided upon, next was the calking. Because of cost hand calking was not to be thought of on this long line, and it was finally agreed that pneumatic calking was the only available method.

The installation of this main was under the direction of the General Superintendent of the Street department. An engineer was placed in charge of the engineering details of the whole route, whose duty it was to see that proper grades were maintained and

that obstacles in the line were removed or arrangements made for clearing them, and to keep a profile and location of the line and to make field sketches.

Four gangs were organized for the work, estimated to take from April 15th to October 1st. Three of the gangs were to work in the south division and one in the Calumet division.

The organization of each gang was as follows:

Foreman in charge of the gang.
Apprentice engineer.
Foreman of calkers, or inspector of joints.
Machinist in charge of the compressor.
Time keeper.
Tool keeper.
Straw bosses as necessary.
The gangs averaged 130 men, with about ten calkers.

The foreman had to direct and be responsible for the gang. The apprentice engineer was to maintain the grades, keep records on the calking and make himself generally useful. The foreman of calkers was to see that the calkers were supplied with material, that the proper quantities were used, to assign joints to the calkers; and was held responsible for the condition of the joints. The machinist in addition to the usual duties, made repairs on the pneumatic tools. The work of the timekeeper and toolkeeper are obvious, and they were expected to roll up and weigh the strands of lead wool for the calkers and to arrange the yarn for the joint.

A course of instruction for street men was started at the South Shop in March, 1912, the apparatus used being the same as that used later on the street, except that instead of a gasoline engine, steam was used to drive the compressor.

A 36-inch joint was used, the bell piece cut in half longitudinally, and held together by bands and heavy bolts. When a joint was calked, the bell piece was separated, thus exposing the yarn and lead and disclosing the character of the work. Each pair of calkers was required to calk two or three joints in one visit to the shop, and returned for further practice in 2 or 3 weeks. From March 11 until April 12, fifty-three men were trained in this method of calking, during which time seventy-six joints were calked. A record was kept of the performance of each man, both as to time and material used, and a fair comparison of the operators was possible. To determine the proper quantity of calking material, other 36-inch joints were made up with lead wool and with cast lead, driven up with pneumatic tools and also by hand. After the joints were completed the bells were broken, the quality of the joint noted and samples taken for specific gravity tests. The report of the laboratory on four samples showed the following:

Lab. No.	Sample.	Sp. Gr. of Section Calked.	Sp. Gr Inner Ring, Calked.	True Sp. Gr. by Fusion.
5402	Lead wool, hand calked.....	10.79	10.61	11.30
5403	Lead wool, pneumatic calked..	11.11	11.26	11.34
5404	Cast lead, hand calked.....	10.84	11,15	11.36
5405	Cast lead, pneumatic calked...	11.29	11.09	11.32

The joints pneumatically calked are uniformly more dense, and their specific gravities nearer to the true specific gravity. The gravity of the ring of lead wool back of the recess in the bell is more dense than in the cast lead joint. Similar tests made of samples taken from bells that split after calking, during the installation of the main, showed whether this standard was being maintained.

The following tests, not made at that time, show the relative specific gravities of the calked product with differing pressures at the compressor:

Lab. No,	Sample.	Sp. Gr of Section Calked.	True Sp. Gr. by Fusion.
5807	12″ joint; 100 lbs. air pressure...	11.25	11.36
5809	16″ joint; 80 lbs. air pressure.....	11.30	11.35

These tests show that a more dense joint is possible with 80 pounds pressure than with 100, but single tests must not be accepted as final proof.

Apparatus and Materials Used.—It was decided that joints on a 36-inch pipe should be made as follows: Three inches of yarn to be inserted and calked by the pneumatic hammers, the weight varying with the size of the joint, averaging about 6 or 7 pounds. The remaining 2 inches to be filled with lead wool, about 75 pounds, this also depending upon the size of the joint. The equipment of gangs was practically the same. The compressor outfit consisted of a 15 H. P. Otto gasoline engine, directly geared to an N. E,-1 Ingersoll-Rand compressor, 170 R. P. M., with a cylinder 8 inches by 8 inches, delivering 76 cubic feet of free air per minute at 80 to 100 pounds. On the frame with the engine and compressor was a compression tank 18 inches by 6 feet, the whole weighing 7,200 pounds. Fig. 2 shows the outfit. An air storage tank 3 feet by 6 feet was provided, so that 6 or 8 pneumatic hammers could be used at once.

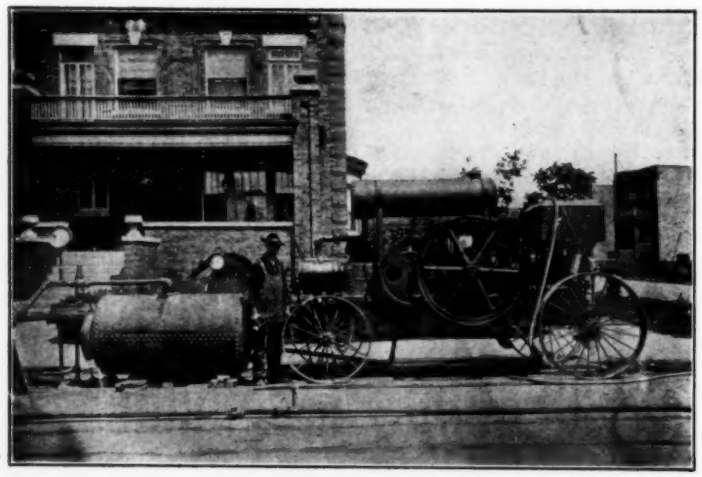


Fig. 2.—Compressor Outfit.

The calkers worked in pairs, each man having a 15-53 H. Ingersoll-Rand Crown Valve pneumatic hammer, 1⅛-inch bore and a 3-inch stroke., delivering approximately 1,800 blows per minute (Fig. 3.) Seven extra hammers were given each gang, so that a defective one could be replaced without loss of time. Each calker had a set of 8 calking tools, and each pair of calkers were provided with a pail containing a hammer wrench, a 10-inch Stillson, an oil can, 3 cold chisels and 1 hand calking hammer. Fig. 4 shows dimensions of the calking tools.

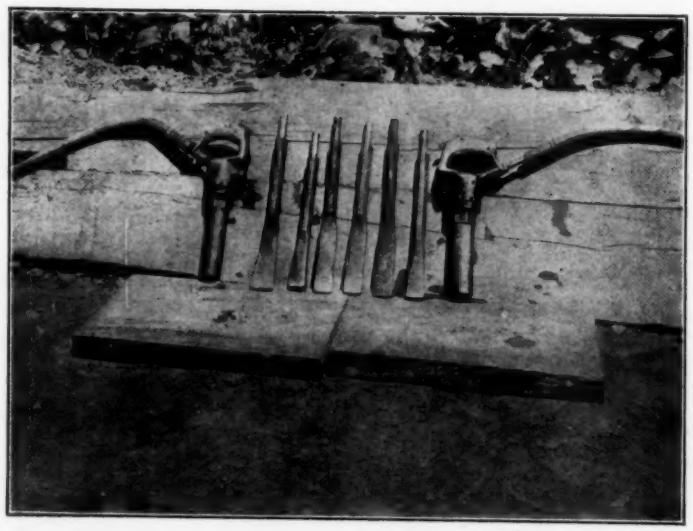
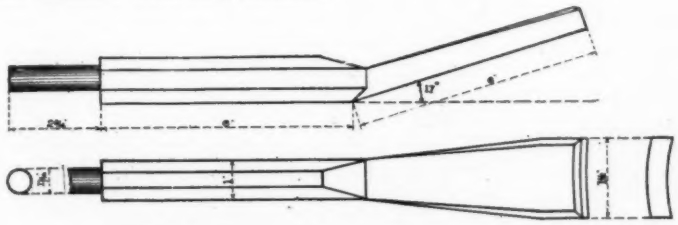


Fig. 3.—Pneumatic Hammers and Calking Tools.

The air was carried through a 2-inch line laid along the trench about 600 feet each way from the compressor, and joined by Dart unions every two lengths. Every 20 feet a branch was taken off, divided to supply two air hose, each having a valve and 25 feet of ½-inch hose connected to the hammer. By this means it was possible to calk a large number of joints without moving the compressor, and it did require long leads of hose. Each gang had diamond points and half rounds for cutting and tapping pipe with pneumatic hammers, but some of this work attempted gave indifferent results.

At the beginning some difficulty was experienced with the pneumatic hammers, largely due to lack of experience of the operators. Among these troubles may be mentioned the loosening of barrels, handles splitting where the barrels were screwed into them, breaks at the inlet of the air, the loosening of bolts, etc. Most of these troubles were traceable to not holding the calking blank tight against the hammer, which allowed the piston to hit against the shoulder of the barrel, the force of the blow being taken up by the hammer itself instead of by the calking blank. With increased experience serious hammer trouble disappeared, minor repairs and replacement of worn out parts being taken care of by the machinist on the compressor. He had a work bench equipped with soft jawed

vice, etc., and duplicate parts, so that the hammers were kept in a high state of efficiency. After each day's work the hammers were carefully cleaned and immersed in a bath of kerosene over night. The whole equipment gave perfect satisfaction after the men became familiar with its operation.



Thickness of caulking tools.

Tool No. 1	¼"
" " 2	3/16"
" " 3	7/16"
" " 4	½"
" " 5	9/16"
" " 6	5/8"
" " 7	11/16"
" " 8	¾"

Fig. 4.—Sizes of Calking Tools.

Method Followed.—The method of installing described was closely adhered to, very few instances neccssitating a deviation, and these caused by local conditions. The preliminary work was done thoroughly, and to this some credit should be given for the success of the undertaking.

The bell and spigot was cleaned before laying, and extreme care used to carry the pipe "home." The centering and blocking were carefully done so that an even joint was insured. After this a piece of yarn was tucked into the joint to exclude dirt, remaining in place until the calkers were ready to begin work on the joint.

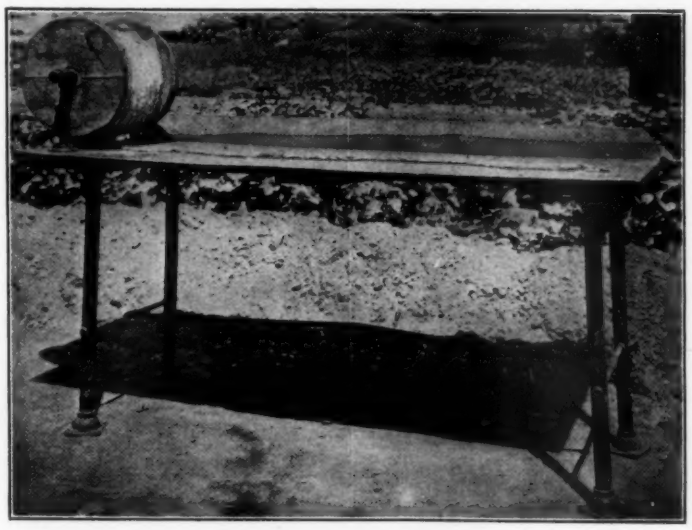


Fig. 5.—Table for Preparing Lead Wool.

The yarn used for calking was prepared at the "camp" and fastened in bundles of around 7 pounds. The lead wool was delivered to the gang in sacks of 100 pounds, where it was rolled into suitable lengths for inserting into the joint, and definite amounts weighed out. Fig. 5 shows the table used for this. The amount weighed out varied with the diametrical thickness of the joints, and it was the endeavor to provide as little over the actual amount of lead needed as possible in order to reduce the waste. Therefore if the joints were averaging 70 pounds, 75 pounds was provided; if they were averaging 75 pounds, 80 pounds was provided, etc. This amount was then put into a box provided for the purpose (Fig. 6.) Each box was numbered and the weight of the lead wool noted on a record card. When the calkers were ready to start on a joint they indicated to the foreman the size of the joint and whether a small or a large amount of lead wool and yarn was required. A suitable bundle of yarn, and a box with the nearly correct amount of lead wool, was then taken to the joint, the number of the joint, the box of lead and the bundle of yard being credited to that pair of calkers.

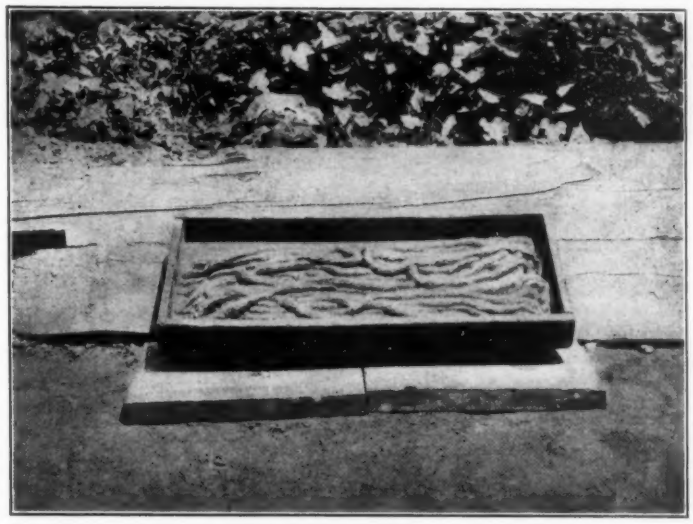


Fig. 6.—Lead Wool for One Joint.

The first step in the joint work was to remove the yarn tucked into the joint at the time it was laid. After this, as additional precaution against dirt, the air hose was used to blow out any dirt which might be in the joint.

The first yarn, about 6 strands, was then pushed into the joint, using tool No. 1. After this was in place, and any excess length cut off, it was calked with tool No. 3 in the pneumatic hammer, each man starting at the bottom and working up to the top without stopping, in order to insure an even distance being maintained on this and subsequent yarns. After the first was tightly driven, another yarn of 8 or 9 strands was inserted, and tools 3 and 5 used to calk it, the same procedure being followed as in the first case. This method was carried out until the yarn came within the required 2 inches of the face of the bell, where the lead wool was to be started. Slack places in the yarning were taken care of by doubling back the extra length instead of cutting it off.

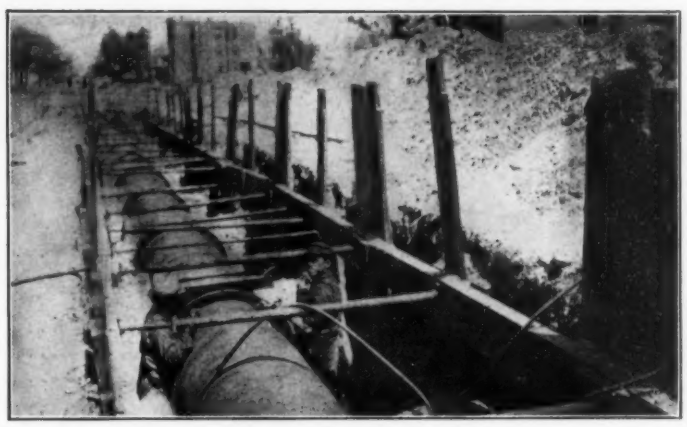


Fig. 7.—Showing Calkers at Work.

Before starting the lead wool a shallow galvanized iron pan was put under the joint to catch any waste that might drop during the calking. When work on the line was first started it was customary to calk separately the first two strands of lead wool inserted, but it was found that this allowed the lead to crawl around the joint, so it was deemed best to calk the first two strands together. Consequently two strands were introduced all around the joint, the calkers working from the bottom upward to the top. When these strands were driven up and even, a third strand was inserted, placed to break joints with that first calked. This ring was calked in the same way as the previous one; this method being followed until the face of the bell was reached, when the joint was finished

off. The full set of tools was used on each joint, save possibly No. 7; the larger sizes and special tools being used when the joints was especially large. After the joint was finished the lead wool and yarn that remained and the waist lead in the pan under the joint were gathered up and returned to the "camp" where it was weighed. Thus the amount of material used was accurately determined and charged to the pair of calkers on the joint. The time yarning and calking the joint was also noted. After sufficient length of main to warrant testing was completed, a test was made, the compressor providing the air. When 15 pounds was reached each joint was carefully gone over with soap and water. Since the number of the joint was recorded with the names of the men who did the work, it was easily seen which were negligent. As a matter of fact, except the first joints calked, few leaked under test. Fig. 7 is a view of the work and shows the pneumatic tools in use.

Since the number of joints calked in a day depended upon the feet of pipe laid, and this latter was dependent upon the character of soil encountered, a statement of the number of joints calked daily would be of no value. It was necessary, however, that each gang average 10 joints per day in order to finish the job on schedule time. There were times when a pair of calkers finished 5 or 6 joints in a 9-hour day, but there were also times when it was possible to lay only 3 or 4 lengths of pipe in a day, and consequently only one joint was calked by each pair. As a general average for the line the time of yarning was 43 minutes, and that of calking 1 hour and 14 minutes.

It was found advisable not to use any lead wool that was wet, therefore a canvas cover was provided for each bell hole for protecting the men and the lead during a slight fall of rain, and also as a shelter from the sun. Rainy days were used to test the line laid. It required two compressors 2 hours and 45 minutes to fill 2,568 feet of main, and one compressor 4 hours and 30 minutes to fill 2,028 feet of main with air at 15 pounds.

Reports.—In order to keep accurate records, daily reports on each gang were made by the apprentice engineer; a "Report of Calkers," and a "Daily Report" containing in detail, the work of each gang. A "Report of Calkers" (Fig. 8) was filled out for each pair of calkers, and contained all the information pertinent to each joint. The "Daily Report" gave a comprehensive outline of the work on each job. The two reports were assembled at the general office, and given to the General Superintendent, who then had an accurate indication of the whole work. In addition to these there was compiled a "Daily Average of Calkers" which gave the cost average for calking and the average material used by each man to date, and this with the record of the joint under test, determined the fitness of a man for an increase of pay. A daily blotter was maintained showing the number of feet of pipe laid the previous day, the total laid and the total to be laid. A progress map was posted daily showing graphically the work done and the pipe strung on the street. Sketches of street intersections, etc., were made part of the record,

REPORT OF CALKRRS

Size.....On.....From.....To.....

Name..... .....Time....Hrs.....Rate..etc.

No. Joint.	Time Yarning.	Time Calking	Total Time.	Time Cost.	Lead Lbs.	Yarn Lbs.	Material Cost	Total Cost.
.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....
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Remarks.....

THE PEOPLES GAS LIGHT & COKE CO.....191....Foreman.

Fig. 8.—Daily Report of Work Done by Calkers.

The total joints calked was 5,917. The average cost per joint was $7.46, divided $1.04 for labor and $6.42 for material. The average weight of material used per joint was 6.2 pounds of yarn and 72.4 pounds of lead wool. The total number of feet of pipe laid was 69,553, at an average cost of $7.09 per foot. The figures are actual costs determined from the daily reports, and do not include any overhead expenses.

After the main was finished and gas at 5 pounds pressure put into it, everyone connected with the work waited for complaints of leaking joints. Experience had been that within a short time after installing a main these complaints started, and it was with incredulity and finally with amazement that it was seen that the main was holding tight. One break developed, but no other trouble was reported; and none has been experienced up to the time of writing this paper. Several stretches of this line have been exposed during other main work; in all about 150 joints have been uncovered, and they are without a fault. While it may be too soon for congratulations it is at least an indication that the work was well done and that the material used was of the highest quality.

Method Since Pursued.—No mention has been made of the kind of lead wool used on this line because it is desired to make this the connecting statement between the description of this installation and an outline of future work, since a change in this product is the most important difference between the work of 1912 and that of following years.

Practically the entire 36-inch main was laid with lead wool furnished by the New York Lead Wool Company, the product of the United Lead Company being used only for experiment. The product of both of these companies was entirely satisfactory, there being little choice between them. Tests showed that both were of lead of a high grade of purity, and when calked closely approached the true specific gravity of fused metal. The change from wool furnished by the New York Lead Wool Company to that of the United Lead Company for later work, was due to the fact that the product of the latter company was supplied in continuous strands coiled on reels, which aided in eliminating waste, and provided easier means of transportation and handling. A reel is shown in Fig. 5.

Except for this change subsequent work has been conducted along the same lines as in 1912. A minor change was made in the compressor outfit, in connecting the auxiliary storage tank to the compressor by metallic hose, thus eliminating the transmission of vibration from the engine to the tank. Air is maintained at 100 pounds pressure in the tank, the outlet having a reducing valve that cuts the pressure to 75 pounds. By this means a more uniform supply can be provided when all hammers are operating, besides obtaining a better calked joint with the latter pressure than with the former. The same calking tools are being used this year that were used on the 36-inch main, the arc of the tools changed to fit 24-inch, 16-inch and 12-inch pipe.

Similar records having been kept, it is possible to give results on smaller pipes. On 443 joints of 12-inch main the total cost per joint has been $1.76, 27 cents for labor and $1.49 for material. On 1,922 joints of 16-inch main total cost per joint was $2.31, 32 cents for labor and $1.99 for material. On 400 joints of 24-inch main total cost per joint was $4.37, 78 cents for labor and $3.59 for material.

The time yarning and calking joints on these sizes, and the weight of the lead wool and yarn used show the following:

Size.	Time Yarning.	Time Calking.	Weight Lead Wool.	Weight Yarn.
12-inch	25 min.	27 min.	16.5 lbs.	1.6 lbs.
16-inch	10 min.	21 min.	23.4 lbs.	2.5 lbs.
24-inch	22 min.	33 min.	42.7 lbs.	6.3 lbs.

In laying 12-inch main one calker works on a joint, on the 16-inch and 24-inch there are two men. The figures on the 12-inch main were made by men inexperienced with pneumatic hammers, accounting somewhat for the slow time.

One worker, in speaking of lead wool, says "Scientific management demands that first cost be not considered, and that construction be based upon service." This expresses in a few words that the first cost of lead wool and the labor of its installation must not be the determining factor. The efficiency obtained by its use on large bell and spigot pipe for gas and moderate pressures should strongly recommend it to gas companies.

War Prices for Gas.

The Metropolitan Gas Company, London, has advanced its price for gas by 12 cents a thousand because of increased coal and labor costs and decreased lighting consumption. This increase in price for gas automatically reduces the dividends payable on stock to 3¾%. Other English companies that have increased their prices are: Coventry, 8 cents; Barnstaple, 8 cents; Enniskillen, 6 cents; Keith, 20 cents; Coatbridge, 12 cents; Carluke, 5 cents; Huddersfield, 6 cents; Truro, 8 cents; Wilmslow and Alderley Edge, 4 cents; Ramsgate, 4 cents; British Gas Light Company, Hull, 6 cents; Ashford Urban Council, 8 cents.

MAINTENANCE OF HOUSE BURNERS.

Competitive Conditions—Necessity of Inspection—Maintenance Systems—Pittsfield Plan—Its Cost and Effect.

[A paper by MR. H. C. CRAFTS read before the New England Section, N. C. G. A.]

The early history of the gas business is synonymous with that of gas lignting. For a great many years, something like three-quarters of a century, after its introduction, the use of gas was confined almost exclusively to lighting. During this time gas was indeed a luxury. The price was high; the efficiency, from present day standards, was low; the service was poor and the consumption small. Yet with all these limitatins it was far and above any other form of artificial lighting. No other method was so convenient or so satisfactory, and even though the cost was greater it was preferred by the somewhat limited number of people who could afford the best.

With the coming of electric light in the early eighties, the owners of gas properties became alarmed, and the rapid increase in electric installations seemed destined to entirely supplant the older form of lighting. The subsequent history of the competition between the two need not be repeated. We are all familiar with the changes and improvements that have been made in artificial lighting during the past thirty years. With every improvement and economy in electric lighting, there seemed to be a corresponding betterment in gas equipment; and with promises of still more efficient burners we should not forget that we were in the lighting business first and that there is no reason, as yet, why we should meekly retire from the field.

We are still in the lighting business despite the pessimistic outlook of our predecessors, and we still have at our command advantages that should enable us to continue as an important factor in this particular field. We have, when properly maintained, a light which is unequaled for general use; efficient, attractive and economical. It seems, however, that to the average gas man has come a feeling of despondency, and that a somewhat increased aggressiveness on the part of electric competitors has caused him to throw up his hands and to say in plaintive tones, "The day of gas lighting is fast going by." Such an admission is but the cry of a poor fighter, of a quitter, of a man who is a "has been."

The lighting end of the gas business to-day is an important factor, both in the percentage which it bears to our total output and the monetary profit we derive. We have only to remember that our days of greatest output are still those with the longest lighting hours to realize what an important part of our output is the gas sold for this purpose. It is impossible to make an accurate estimate of the gas sold for lighting. The best figures obtainable place it as at least 40% of the total gas sold, and, I think, we must admit that not only can we ill afford to lose such a large part of our business, but that we should make a determined effort to hold and increase the quantity of gas used for lighting. In these days of multiplying uses for gas, we may well ask ourselves "are we giving sufficient attention to the original and primary use for gas—namely, gas lighting?" It is true that the uses for gas are so numerous that we will still have a large output if we do gradually lose our lighting business, but it is also true that the successful development of any company is dependent in large measure upon its production, and this will be materially lessened if we are unable to hold the lighting output. We can better afford, at the present time, to neglect any other department of the business. Why? For the reason that the other uses for gas, industrial, cooking, water heating, supplementary house heating, etc., are largely non-competitive, and whenever we choose to make a determined effort to sell gas for these purposes, we have every assurance that our efforts will be successful; and this will be just as true in three years or five years as it is to-day. This business will be waiting for us when we are ready to make overtures for it.

The lighting business is different. It is strongly competitive and if we once lose our hold upon it, we shall find it increasingly difficult to get it back or to secure new business of the same kind to take its place. The principal sources of revenue for an electric company are power and light; the first can be sold to relatively few customers, and it is only natural that companies should show greater energy and care in developing the lighting business. The fact that we have competition in this particular field, should not however cause us to relinquish it, but rather to study the situation carefully and adopt such methods of installation and maintenance of gas lighting equipment as will make the use of gas for lighting attractive and satisfactory to the consumer.

If we are to meet competition, we should ask ourselves first; what is the matter with gas lighting? To this question, I have no hesitancy in suggesting an answer. It is this: The reason why we are having trouble in holding and developing gas lighting is poor service, carelessness and negligence. It is generally accepted to-day by public utility companies, that it is not only the duty of such corporations to give real "service," but that the giving of such service is good business and a paying proposition from a financial standpoint. The manager of the average gas company honestly believes that he is giving the best possible service to his consumers, and, in general, that is true; but when it comes to the department of gas lighting it is "service" pretty nearly in name only. The consumer is left to his own resources and we find him using burners and equipment that are very much below normal efficiency.

The service we render our consumers is *vastly* inferior to that rendered by the electric companies. By this I do not mean necessarily that we are more careless or negligent than the electric people, but rather that satisfactory lighting by gas can be secured only by much greater care and attention at the point of consumption, and that with a minimum amount of service at the lamp the electric light will normally be in far better condition. The requirement for good service by an electric company is satisfactory current delivered at the socket, and it is only necessary to substitute a new lamp for one that has become dimmed or broken, to secure as good a light as at any previous time, and this renewal can be easily and satisfactorily made by the consumer himself. The requirement for good service on the part of a gas company is not only a satisfactory supply of good gas at proper pressure to the fixture, *but* this gas must be consumed in burners that are properly equipped, clean and correctly adjusted. The average consumer is unable to properly install or maintain an incandescent burner over a long period of time; and good service demands not only a satisfactory supply of gas at the burner, *but* regular and intelligent inspection and adjustment of the burner itself.

I am aware that some of you either do not know or will not admit that conditions among your own consumers are as bad as these statements suggest; but I feel absolutely sure that there is no gas company in the United States to-day that is giving good lighting service unless it makes periodical and regular visits of inspection. Gas lighting conditions all over this country are bad; the service is poor, and the average burner is operating at perhaps 60% of its efficiency. We must remember that even with a unit cost for gas one-half that of electricity, there is not much difference in the cost of equal quantities of light if our burners are only 50 or 60% efficient.

If we admit that gas lighting conditions are poor and that this is caused by the inability of the average consumer to properly care for his burners, we may ask ourselves—what can we, as gas companies, do? How can we increase the efficiency and service of our lighting business? There seems to be but one answer to these questions, viz.: A system of regular and systematic inspection by expert company employees. Several methods of doing this have been tried or suggested.

First.—By contract between the company and consumer to regularly inspect and maintain his burners, furnishing all necessary material; payment to be made monthly or yearly at a stated amount per burner.

This method is effective in the limited application that is possible; but experience seems to show that not over 10% of consumers are willing to accept such a contract, leaving perhaps 90% of the lighting business un-improved

Second.—A method of "Request Maintenance;" consumers being urged to report to the company any deterioration or lack of efficiency in their lighting equipment, the company, on their part, undertaking to promptly improve conditions. A charge is made for material supplied, the labor being furnished gratis. Modifications

(*Continued on page 250*)

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SANFORD K. CAMPBELL, Editor.

NEW YORK, MONDAY, APRIL 19, 1915.

D. R. RUSSELL DEAD.

Daniel Renouard Russell died suddenly in New York on April 9th of heart disease. Dan Russell (as he was called by his friends) was born in St. Louis, Mo., in 1862, and when quite young began business under his father, T. G. Russell, one of the founders of the Parker-Russell Mining and Manufacturing Company. He worked for this company in various capacities until 1907, when he was made its president, from which office he resigned in October, 1914, to form the D. R. Russell Engineering and Development Company.

Mr. Russell's death came as a great shock to his many friends, as he was apparently in very good health. He was a member of numerous gas associations and other societies, prominent in St. Louis business circles and undoubtedly the best known man in his line of business in America.

Mr. Russell was buried from his home in St. Louis on April 12th. He is survived by his wife and a son, Kennerly Russell.

Mr. Russell was an old and valued friend of the JOURNAL, and we extend our deep sympathy to his family.

ELECTRIC COOKING.

The little item on page 242 of this issue of the JOURNAL is from an electrical publication, and is published to draw attention to this developing competition in domestic cooking. The weakness of their claims is, however, evident if the figures quoted are analysed. The largest monthly bill for a family of three persons is given as $3 for current at 3 cents per kw. hr.; equivalent to a consumption of 100 kw. hrs. One kw. is equivalent to 3,412 B. T. U., so 100 equals 341,200; which from gas of 600 B. T. U. per foot could be had by burning 570 cubic feet. The comparative cost of electric and gas cooking in this case, with the current at 3 cents and gas at $1, is therefore as $3 to 57 cents; with current at 10 cents it would be as $10 to 57 cents.

A CHECK ON ENTERPRISE.

President Ira C. Copley of the Western United Gas and Electric Company, appearing before the Illinois Public Utilities Commission, in the hearing of an application by the Southern Illinois Gas Company to do business in Williamson county, criticised severely commission control of public utilities. Here is a startling assertion:

"Since the public utility commissions have been created in the various States not one new corporation of that character has come into existence. The restrictions placed upon them, the difficulties and the handicaps imposed are such that it is financially impossible to start a new company. The only new utilities that have come into being are a few small mutual telephone companies. New development has been stopped entirely. This is not a temporary stagnation. Massachusetts has had a commission for 20 years, New Jersey for 6 years, Wisconsin for 5 years, New York for 3 years, and Illinois for 2 years; and my figures cover this entire period."

"THE OLD GUARD"

The recent death of Mr. Isaac Battin, who became a member of the American Gas Light Association in 1873, calls attention to the decreasing list of older members. Of all those who belonged to that association 35 years ago, or in 1880, but 11 now appear on the list of members of the American Gas Institute. This Guard of Honer is:

Mr. Emerson McMillan	1874
Mr. Wm. H. Bradley	1875
Dr. A. C. Humphreys	1875
Mr. John McIlhenney	1875
Mr. Chas. H. Nettleton	1875
Mr. Wm. H. Pearson	1876
Mr. A. H. Barrett	1878
Mr. Edward C. Jones	1879
Mr. William McDonald	1879
Mr. Geo. G. Ramsdell	1879
Mr. Cyrus Borgner	1880

ILLUMINATING ENGINEERING SOCIETY.

A meeting of the Council of the Illuminating Engineering Society, held April 8 in the general offices of the Society, 29 West 39th street, New York, N. Y.

Among the reports submitted special interest attaches to those summarized below:

Ths Committee on Glare: Two reports—the second and third of a series to be submitted by this committee—on the subject of "The Optical Properties of Diffusing Media." One gave a classification of diffusion, its nomenclature and the physical theory; the other dealt with instruments and methods of measuring diffusion and the theory of diffusion photometry. Both reports contained a wealth of valuable data and will be published in the Transactions of the Society.

The Committee on Lighting Legislation reported that it had considered (1) a report containing material for formulating a code on factory lighting, received from the Committee on Factory Lighting; and (2) a report by the Committee on School Lighting containing material upon which it is proposed to base a code on school lighting. The function of the Committee on lighting Legislation is to distribute data and reports to legislative bodies, school boards, public service commissions and other bodies or individuals who may or should be interested in enactments, rules and regulations for better lighting.

The Committee on Editing and Publication recently issued a small pamphlet setting forth the general style and requirements of the papers and publications of the Society.

The Committee on Reciprocal Relations with Other Societies reported that it is continuing its efforts to popularize the work of the Society among those organizations believed to be interested in the better illumination propaganda. For this purpose the Society has available for loan to lecturers, slides and printed lectures on school lighting and on some of the fundamental principles of illmination.

The report of the Committee on Membership showed 117 applications for individual membership received since Oct. 1, 1914.

It was announced that the 1915 convention of the Society would be held in Washington, D. C., at the New Willard Hotel, September 20–23 inclusive.

Those present at the meeting were: Messrs. S. McAllister, president; E. M. Alger, C. O. Bond, H. Calvert, J. D. Israel, C. A. Littlefield, general secretary; L. B. Marks, treasurer; Preston S. Millar, Alten S. Miller and J. Arnold Norcross.

[Special Editorial Report.]

SEVENTH ANNUAL MEETING, PENNSYLVANIA GAS ASSOCIATION,

And Joint Meeting of New Jersey State Gas Association.

Another sign of Spring came true when the Pennsylvania Gas Association opened its sessions at the Adelphia Hotel, Philadelphia, on Wednesday morning, with President Dutton and Secretary Lamson officiating.

It was strictly a business session, for after the address of welcome by Hon. Geo. D. Porter, Director of Public Safety, Philadelphia, committee reports came in abundance. After the election of new members, the rolls showed a total of 150, over half of whom were in attendance. One number not on the regular listing was an appeal for subscriptions to a report of Public Service Commission decisions called "Utilities Reports Annotated," made by Mr. H. A. Smith. He was backed up by Mr. W. H. Gartley and Mr. H. H. Ganser, who expressed their opinions as to its value.

The Public Relations report and that on Uniform Accounting, both by Mr. Keppleman, and the report on Architects' Booklets, by Mr. Dutton, were the principal important topics, and all routine matters were disposed of by 12:30, when the session adjourned.

New Jersey State Gas Assoiation.

While the business session of the Pennsylvania Association was being held in the Roof Garden, a similar meeting of the New Jersey State Gas Association was held in the Gold Room. President Butcher, assisted by Secretary Potter, kept things going in good shape. The principal event was the election of officers, which resulted as follows:

President—S. J. Franklin, Millville.
Vice-President—C. E. Bartlett, Philadelphia.
Secretary-Treasurer—O. F. Potter, Newark.
Directors—H. H. Newman, Passaic; R. H. Garrison, Atlantic Highlands; J. W. Brock, New York; J. F. Prendergast, Salem.

The report on membership showed a very healthy condition, 125 being the total.

Joint Session.

In the afternoon the joint session of the two associations brought the two Presidential Addresses, first that by Mr. C. H. Butcher, followed by Mr. L. R. Dutton.

Then came the paper on the "Benefits of Educational Work for Gas Company Employees," by Mr. H. Thurston Owens. The importance of this subject was attested by those who discussed it, Messrs. R. F. Pierce, J. P. Hanlan, W. M. Halsey and P. S. Young participating.

The Secretary of the International Gas Congress, Mr. Geo. G. Ramsdell, then outlined their plans, which calls for the meeting the last week in September at San Francisco.

The final paper of the session, "Residence Lighting," was read by Mr. R. F. Pierce. By this time the members had become enthusiastic, and the discussion by Messrs. Conroy, Hanlan, Ganser, Barnes, Stewart, Owens, Rhoades and Morris filled the time to adjournment and resulted in a resolution for the formation of a Committee on Gas Lighting Fixtures. It is hoped that this will bring further co-operation between the gas companies and the company members manufacturing fixtures.

This evening's banquet was unique in many respects. The ladies were with us—the men wore hats (of paper)—the two Associations were the guests of the Philadelphia Gas-meeters—and what was not unusual, everyone dined well, water flowed like champagne, and everyone was happy.

President Dutton introduced Toastmaster Bartlett, and the latter was quite as adept an entertainer as those whom he introduced. Mr. John Gribbel made the serious speech of the evening, telling us that we were far too modest, and that we must use greater publicity if we are to achieve the success that is possible. He was followed by Mr. E. J. Cattell, whose facile expression carried his hearers to the heights—to laughter, to sadness and back to do better things. His appeal for "brotherly love" was of the virile, stalwart kind and it reached many of us. Following two such speakers the others realized that brevity was the soul of wit, and the speeches of Mr. G. G. Ramsdell, for the International Gas Congress; Walter Forstall, for the Institute; Will W. Barnes, for the Commercial, and S. J. Franklin, for the New Jersey Association, were all short and to the point. No Philadelphia Gas Meeter's dinner could be complete without Ehrenzeller, his baton and his band. They were all there, and we sang and sang and sang.

After the dinner there was dancing and most every one danced and danced and danced. The menu and dance program were bound in a leather card case bearing the Meeters imprint.

Thursday.—This morning's session was opened at about 10 o'clock, with Vice-President Philbrick presiding, and the paper first read was that by Mr. J. H. Gaylord, on "Domestic Uses of Gas." Mr. Gaylord handled the subject a little differently from most writers, and provoked a very good discussion. Mr. Brock spoke of the very narrow margin of profit between makers' costs and their prices for appliances, as limiting their contributions to National Advertising. Mr. Bartlett, on these same lines, called attention to the different organizations and growth of the electrical business; particularly the control of central stations by the large makers of appliances. Mr. Myers told of Philadelphia co-operation with department stores and builders; others who discussed this paper were Messrs. Keppleman, Cole, Thompson, Harris, Rhoades and Russell.

Secretary Lamson read a letter from the Indiana Gas Association, telling of their action on gas rates, and asking the Pennsylvania Association to co-operate by appointing a Committee on Rates to work with those of other societies.

On motion, the President, the Vice-President and retiring President were made such committee.

Mr. Keppleman spoke of the appointment of the delegate to the Gas Congress and moved that the Association defray the expenses of his trip to San Francisco. This was agreed to.

The Secretary made announcement of the entertainment for the afternoon, and the dinner and meeting at the Country Club this evening; and the session adjourned.

After lunch it was all aboard autos for the ride through Fairmont Park and the beautiful country served by the Suburban Gas and Electric Company. Stopping to look over that company's showroom and works, the trip ended at the Old York Road Country Club, where there was the annual baseball matinee between the Gas Men and Pedlers, and golf for others.

At 6:30 dinner was served, and at 8:30 the evening session was called to order by President Dutton.

The first business was the report of the nominating committee, presented by Mr. Ganser. The names suggested met with approval, and the following were unanimously elected:

President—B. F. Cresson, Easton.
First Vice-President—F. P. Duggan, Lewistown.
Second Vice-President—J. H. Gaylord, Hazleton.
Members of the Council—L. S. Williams, Harrisburg: W. R. Rhoades, Williamsport: C. A. Wakeman, Wilkes-Barre; G. W. Thomson, Chester.
Secretary-Treasurer—W. O. Lamson, Jr., West Chester.

The committee on place of next meeting reported through Mr. Williams, recommending Easton for 1916, which was formally chosen. Mr. Ganser presented the report of the Finance Committee.

The subject for the evening's debate was then introduced by President Dutton, and J. W. Myers, Louis Stotz and F. P. Kelsey named by him to act as judges. "That a New Business Department is a Economy Not an Expense," was discussed by Messrs. Shattuck, Conroy, Bigelow, Harris, Rushin, Bartlett, Harbison, Guitteau, Pennewill and Stotz. Mr. Myers, for the judges, decided for the affirmative, although, as he said, the majority, by the silence, seemed to think the other way.

Then at 9:45 we met the special trolleys provided and were back at the hotel in about an hour.

The business left for Friday is the full program for that day's session, and in addition Mr. Bartlett's paper on "Water Heating by Gas."

This convention has made history in gas association work. The joint meeting of the two State associations; the formal presence of representatives of the two National bodies; the unique banquet and entertainment by the Philadelphia Gas Meeters; and most important, the character of the men and papers, give the officials reason for self congratulation.

(*Continued from page 247.*)

Maintenance of Gas Burners.

of this plan have been adopted by numerous companies and with some measure of success. The objections to this method are:

(a) The consumer is made the judge of condition of the burners in his house and many of them do not know that their burners are operating at low efficiency.

(b) The consumer will frequently delay giving notice to the company, either from carelessness or from a mistaken idea of economy, believing that a mantle can be used "just a little longer."

(c) Only a part of the consumers can be induced to co-operate with the company in the development of this plan. From reports received from companies who are following this plan, the proportion seems to be not over 25%, leaving 75% of the lighting business that has not been improved.

Third.—"Free Maintenance" of house burners, whereby all burners are regularly inspected and maintained with no charge for either material or labor. This method was described at length in a paper read before the New England Association of Gas Engineers in February. This plan will be effective in improving lighting conditions, but the cost, estimated at 10 cents per 1,000 cubic feet gas sold, would seem to make it impractical from a financial standpoint.

Fourth.—Periodical inspection and maintenance by regular employees of a company; every house using gas being visited, the lighting equipment examined and put in order with no charge for labor; material being sold at regular prices. The profit on material sold goes to reduce the labor cost. This method has the merit of universal application—practically every house in the city being examined and at comparatively low cost to the company.

This is the method that we have been using at Pittsfield for several months, the plan being as follows: To call at every house in the city where there is a gas meter, and ask permission to clean, improve and regulate the entire lighting system; no charge being made for the labor thus furnished. After this work is done, to supply when needed, and only upon written order, such mantles, burners, etc., as may be required to further improve conditions; these supplies sold at regular prices. We hoped that the profit from the sale of these goods would materially reduce the otherwise heavy expense, and this expectation has been justified. We selected from our Jobbing Department four regular employees and instructed them very thoroughly in all phases of lighting troubles they would be likely to meet. We followed these instructions with several conferences upon the subject of salesmanship, making such preliminary suggestions as seemed necessary, and these conferences were continued after the work had been started, and many practical and valuable ideas were furnished by the men themselves. Necessary supplies are carried in a small trailer, and consist of a complete assortment of burners, mantles and glassware. The trailer was built for the purpose, being an old spring wagon to which a covered body is added. It is weather proof, has doors and locks, and is painted to correspond with our regular stable equipment. Each morning this trailer is drawn by one of our automobile trucks to the territory that is to be canvassed, and left at the side of the street during the day. The four men work the neighborhood, each taking a house at a time. If it becomes necessary to move into the next street, the trailer can easily be drawn by the men, and at night it is towed back to our shop by the truck.

In the actual working of the plan, a man knocks at the rear door and when it is opened says simply, "I am the gas man," and steps into the house. He then asks permission to clean and regulate the burner equipment, showing a company badge and presenting a card which explains just what the company is trying to accomplish. This card reads as follows:

To Our Consumers:

This card is presented by one of our regular employees, an expert and trained lighting man.

We ask that he be given access to all of your gas lighting equipment for the purpose of inspecting, regulating and improving them. There will be no charge for any work that he may do. Should he deem it advisable for you to have new burners, mantles or glassware, he will supply them at your request and only upon your written order. This material will be supplied at our regular prices.

We ask for your co-operation in our efforts to improve the lighting conditions of your house.

At your service. PITTSFIELD COAL GAS COMPANY,
H. C. Crafts, Manager.

The work is very thoroughly done, even to the washing of every globe. Improvement is so noticeable and the light so greatly increased, that the householder does not think of our man as a salesman but as an expert workman who knows what he is talking about, and she welcomes his advice as to new mantles, burners, etc. The workman secures this material from the supply wagon and puts it on, obtaining a signed order for it.

Of the four men whom we selected, two were drawing $3 per day, one $2.75 and one $2.25. We continued their pay upon this basis, giving them in addition a commission of 10% upon all goods sold as an incentive to push sales. We have kept a record of the work done in each house and have tabulated them. We have also charged to our "House Maintenance" account every item of expense incurred in carrying out this work; and the net results accomplished by the individual men. The following is a summary of the work done between November 12, 1914, and March 15th, 1915:

Total calls made	3,001
Flat flame burners inspected	10,928
Flat flame burners put on	2,954
Incandescent burners inspected	6,573
Incandescent burners adjusted	5,583
Material sold	$2,561.34
Profit on material sold	1,055.25
Paid out for wages, commissions, incidental expenses, etc.	1,335.38
Less profit on material sold	1,055.25
Leaving total net cost	$280.13

A brief analysis of these figures is suggestive. The average number of calls per man per day is 8.2, which for an 8-hour day gives one hour to each call.

In 3,001 calls we find an average of 2.2 incandescent burners per house. This would seem to suggest that there are still a number of open flame burners used, an inefficient and expensive method of securing light from gas and offering but little resistance to aggressive, modern, electric competition.

The sale of additional incondescent burners will place gas lighting on a firmer basis to resist the inroads of the electric company. We do not adjust an incandescent burner unless it is necessary; yet out of 6,573 burners, it was found necessary to adjust 5,583, over 84%. This shows our condintions in concrete form, and there is no reason to believe that they were worse than those of the average company.

Our gross cost of making 3,001 calls, exclusive of material, was $1,335.38, which is reduced by the profit on material sold to $280.13. This is a aversge of 76½ cents per man per day, or 9.3 cents per call.

We have, at a total cost of $3.06 per day, kept 4 men continuously at work bettering the lighting conditions in the houses of our consumers. Is this small expense justified and does it pay? It seems to me there can be but one answer.

It should also be noted that these costs cover the whole period during which the plan has been in operation, and as we gain in experience and knowledge we are reducing the cost to a lower figure.

We hope, by a process of elimination and selection, to secure a force of men for this particular work, that, with added experience, will reduce the expense to a point where the actual cost to the company will be little or nothing.

Now, taking the above actual figures, if it costs 9.3 cents per call, and we have 7,500 lighting consumers, it means that we can make an inspection of every house in the city where gas is used for light for $697.50. It seems probable that if we make three inspections per year the burners can be maintained properly and kept in good condition. Three complete inspections would cost us $2,092.50; we had an output during 1914 of 206,000,000 cubic feet, and that is approximately one cent per 1,000 cubic feet sold.

The figures given in this paper are the concrete results that can be reduced to statistical form. No attempt is made to calculate the credits or offsets that should properly be made, as follows:

1. The increased business secured by replacing kerosene burners and electric lamps with gas burners.

2. The increased goodwill by betterment of service.

3. The constructive work accomplished by demonstrating that gas is really a satisfactory light.

4. The advertising secured by the circulars and advertising matter left by the maintenance men.

5. The increased sales in our appliance department as a result of this advertising.

In conclusion I would say that I believe the time has come when it is absolutely necessary for a gas company to adopt some definite method of house inspection and maintenance. There may be other methods as good or better than the one here outlined, but this at least has the merit of accomplishing the desired result at relatively low cost.

Pumping Water by Compressed Air.

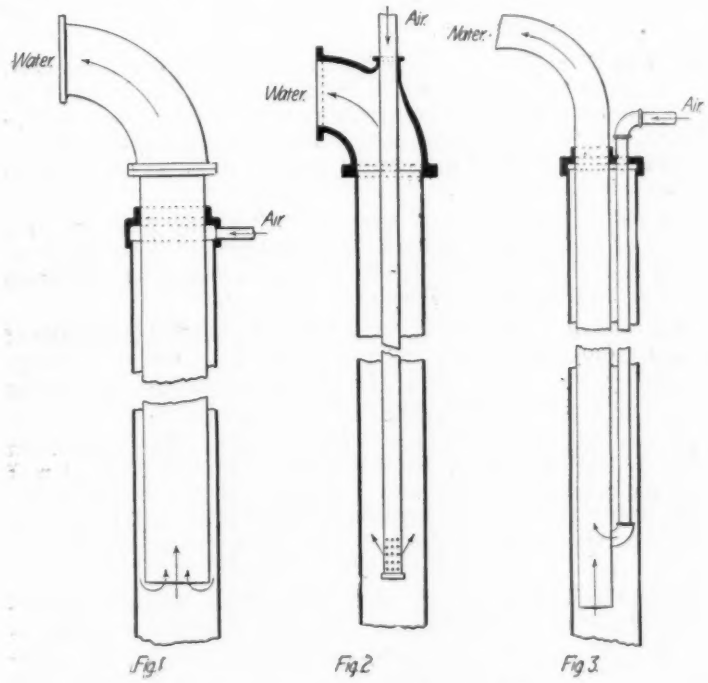
By G. C. THOMPSON, in "Engineering Digest."

Many industrial plants experience considerable difficulty in securing an adequate water supply from ordinary sources and are constantly expending money for the improvement of their impaired supply or the creation of a new source. Ofttimes it is necessary to resort to boring an artesian or deep well where underlying water strata are known to exist. In such sections there are usually more than one such stratum having a channel through rock crevices or "faults" or more commonly in a stratum of sand. Where the various water strata are definitely fixed by operating wells and the quality and quantity of water being secured is known, it is comparatively easy to determine to which stratum the well should be drilled.

There are two classes of wells, the artesian or flowing well, and the deep pumping well in which water rises to some distance below the surface. The height to which the water rises is known as the static head of the well. The static head is variable, even with wells in proximity to each other and it is therefore necessary to install some type of pumping device to force the water to the surface. For this purpose two practical systems have been devised; the deep well pump system and the air lift system. This article proposes to describe the test of an air lift system in a deep well in Montgomery, Ala.

The depth of the well is 410 feet, and the supply lies in a 16-foot stratum of sand. The well is cased with standard 6-inch drive pipe for 383 feet. To prevent the sand from filling the drilled hole below the end of the drive pipe, a 20-foot brass strainer was "washed" in, having attached at the top 15 feet of 4½-inch black pipe with a lead collar for packing off to the 6-inch drive pipe to make a water tight joint.

The equipment for the test was a 30-horse power portable boiler and a 10 × 10 × 10-inch steam driven air compressor, with an ordinary range boiler with a 100 lb. pressure gauge for an air receiver. Having connected this equipment, a line was dropped into the well, and the static head was ascertained to be 41 feet below the surface.



Three Methods of Constructing an Air Lift.

Three principles of applying the air lift may be used:

First.—Forcing air into the well around the outside of the water or eduction pipe, provided the outer casing is air and water tight in the well. Fig. 1.

Second.—Forcing air through a pipe placed within the eduction pipe. Fig. 2.

Third.—Running an air line between the eduction pipe and outer casing nearly to the bottom where it is tapped in. Fig. 3.

For reasons of economical operation it was decided to utilize the principle known as the Pohle system (Fig. 3). The air and water pipes must descend below the static head water level far enough to provide a quantity of water commensurate with the capacity of the well. Each well must be treated independently and separately. The diameter of the discharge pipe must be in proper proportion to that of the air line. That is, a proportionate displacement must be made within the well casing, regardless of the air pressure, for without this the air is likely to ascend to the surface through the water in bubbles. The volume of water and air admitted for passage through the eduction pipe must be properly balanced. While there are no absolutely fixed ratios for calculating the proper displacement, for ordinary practice, the area of the air line should be approximately one-tenth the area of the water line.

The correct proportion using usual stock sizes of pipe is: Air line 2 inches diameter, area 3.14 square inch; eduction line 6 inches diameter, area 28.27 square inch. This ration is 1 to 8.9, which provides a satisfactory installation.

Having decided upon the method of applying the air, it was necessary to ascertain the quantity of water the well would yield per foot depth of water, in order to calculate with reasonable accuracy the total capacity of the well. Two means of ascertaining this are available: (1) by pumping into the well a given quantity of water in a certain time, or (2) by lifting out a quantity to be measured. The latter method is more accurate and was therefore adopted. With an arbitrary percentage of submergence, the Pohle system was installed. In order to secure full efficiency of the air a nipple was screwed inside the water line where the air line tapped in, and turned upward. Later, this practice was found wrong, because sand and silt settled in the elbows when the air pressure was removed, forming an obstruction in the air line which air pressure would not remove. This defect was corrected by drawing up the line and putting in a sweeping elbow fitting.

For the discharge pipe, 252 feet of 3 inch black iron pipe was installed, tapped 16 feet from the bottom by a 1-inch air line. To measure the water discharged a weir was constructed provided with a blow box and splash boards to prevent waves interfering with accurate measurement at the discharge.

The starting pressure required was calculated from the depth of the submergence in feet. 0.434 pound air pressure will raise one foot of water; our submergence deducting the height of static head to the surface and the length of the eduction pipe below the point tapped by the air line, was

252 feet — 41 — 16 = 195 feet submergence.
195 feet × 0.434 lb. = 84 lb. starting pressure.

With a steam pressure of 95 lb. gage and air pressure of 85 lb, the compressor pumped 65,448 cubic feet air per minute. When the air was released upon the well the flow began immediately. The body of water between the static head and the point at which the air entered, flowed in practically an unbroken stream, after which the flow became intermittent, a "chunk" of water and then air. The starting gage pressure was 79 lb., and immediately after the flow began dropped to 45½ lb. After pumping for an hour the measurement taken from the weir and the 15-inch opening was 88.25 gallons per minute.

It was observed that the difference between the starting and working pressures was 33½ lb. From this, and considering the quantity of water secured and the yield of water per foot, it is evident that the water is drafted below the static head. Having already calculated that 0.434 lb. air pressure is required to raise one foot of water, then 2.31 feet of water is raised by 1 lb. of air pressure. It was therefore calculated: 33½ lb. air × 2.31 feet =77.38 feet drafted. This figure includes the pipe friction which must be deducted to ascertain the exact depth and yield. The friction head in this case, pumping 89 gallons per minute 236 feet through a 3-inch pipe, was approximately 2.54 lb. air pressure or 5.88 feet. Therefore the actual pumping head was 77.38 feet + 41 feet — 5.88 feet = 112.5 feet below the surface; and the yield in gallons per foot drafted was

$$\frac{89}{77.38 - 5.88} = 1.24 \text{ gal.}$$

The well now stands: static head 41 feet from surface; pumping head, 112.5 feet from surface; yield, 1.24 gallons per foot drafted; percentage of submergence 47.5. Thus to secure 125 gallons per minute, we must draft 125 ÷ 1.24 = 100 feet and the total head

would be 100 feet plus 41 feet static head, or 141 feet. From experience it has been found that for a lift of 141 feet the proper percentage of submergence of the eduction pipe is 55 (see table) or 182 feet. The eduction pipe and air line should then descend to a total depth of 323 feet, air escaping around the outside of the eduction line.

Air Lift Table.

Lift in feet.	Submergence in feet.	Percentage Submergence.	Actual air per gallon.	Lbs. air pressure not including friction.
20	39	66	.20	17
40	71	64	.26	32
50	86	63	.30	39
60	98	62	.35	44
80	120	60	.41	54
100	138	58	.48	62
125	159	56	.60	71
150	184	55	.68	83
175	206	54	.74	98
200	221	52.5	.80	100
250	250	50	.96	112

The same size eduction pipe is maintained, but in order to reduce the friction in the air line it was increased to 1¼-inch to a point 10 feet above where it taps the water line.

The installation is now all complete for delivering 125 gallons of water per minute to the surface. The size of equipment necessary for operation is as follows: The lift of 100 feet requires 0.48 cubic feet per gallon of water (see table). The volume of air necessary will therefore be: 125 gallons × 0.48 cubic feet = 60 cubic feet per minute.

The starting pressure required will be the number of feet submergence, less the static head multiplied by the pound pressure required to raise one foot of water, plus friction in air and eduction lines: 282 × .434 + 8.2 = 130.5 lb. The working pressure, including friction in both air and eduction pipes, is 62 lb. It is readily observed from the foregoing that a standard slow-speed high-pressure air compressor with a piston displacement of 75 to 80 feet per minute is required, allowing 20% and 5% for the volumetric efficiency of the compressor, for which, if belt driven, 25 horse power should be provided.

Coal Supplies for English Gas Works.

The "London Journal" says many small gas works in the West of England are placed in an extremely awkward position by the difficulty of obtaining coal supplies. Several works are carrying on business under considerable anxiety with no immediate prospect of relief. In some instances the instructions issued by the Military authorities for the restriction of public and private lighting have been hailed as a blessing, because of the relief which has been given to the demands upon the rapidly depleting stocks of coal.

At Saltash, the Gas Company initiated a proposal for the reduction of the lighting by extinguishing the public lamps at 9 or 10 P.M.; and the Town Council agreed that they shall be put out at 10 o'clock. It was explained that the company had been since November vainly expecting the arrival of a cargo of coal, and, though it might come any day, they thought it better to economize on the public lights, rather than run the risk of leaving the houses in darkness. Members of the Corporation appreciated the difficulties of the position, and expressed the hope that private consumers would assist the company by being economical in the use of gas.

Kingsbridge, another small town near the sea has similar trouble. There, the supply of gas has been so restricted that the consumers have complained, and the Town Association has been moved to consider the question of the erection of an electric light plant. The matter was mentioned at a meeting of the Urban District Council, and the Chairman who knew the facts, was able to explain the position of the gas company. The company had ordered coal of the best quality for gas making, but were unable to get it delivered, and at the beginning of the month would have had to close the works, but for the kindness of a local firm who let them have a supply of coal.

Another town that has experienced some trouble is South Molton. The South Molton Gas Committee could not get coal delivered according to contract, and had to pay 5s. or 6s. per ton more than the contract price. The Mayor and the Gas Manager decided that it was desirable to reduce the consumption of gas, and had most of the public lamps extinguished, and it was suggested that private consumers should be asked to be as economical as possible.

Publications.

Street and Boulevard Lamps.—Thos. T. W. Miner, New York, shows in his catalogue No. 47 a line of various types of post lamps, hanging lamps, bracket lamps, lamp posts, standards and accessories for gas, gasoline and electric street lighting.

Lighting Appliances and Accessories.—The Welsbach Company have issued under date of March 1st, 1915, a catalogue devoted to the various types of arc lamps manufactured by them; showing also the various styles of reflectors and glassware for arc lamps. A portion of the catalogue is devoted to ornamental posts, brackets, sundries, maintenance tools and lists of renewable parts of the lamps.

A folder shows and describes the new Welsbach Kinetic Gas Bowls.

Another folder shows and describes the "C. E. Z." lights, and the many adaptations of this unit are illustrated.

The Thomas Meter.—The Cutler-Hammer Mfg. Co., have issued a booklet on the construction of the Thomas Meter, for indicating, intregating or graphically recording the quantity of flow of gases. A complete description of the meter is given with illustrations and diagrams.

A leaflet describes some meters in actual use, and in each case gives the performance of the meter under ordinary working conditions.

McDonald Meters.—D. McDonald & Co., have issued a new catalogue showing types and sizes of regular and prepayment meters; and containing charts of repair parts, which are listed and numbered.

Gas Coals, Industrial Coals, Smithing Coals and Domestic Coals.—Four booklets bearing these respective titles, are issued by the Consolidation Coal Co. The book contains maps showing the mining districts and shipping points, views of mining districts, mining machinery, charts, results of tests, analysis of coals. A general description is given in each booklet of the particular kind of coal and its uses.

Coal Driers.—The Wendall Centrifugal Coal Drier, Bulletin No. 212, by the Link-Belt Co. This bulletin contains illustrations and a brief description of the drier.

Wagon aod Truck Loaders.—The Link-Belt Co., Catalogue No. 190. In this is shown a line of portable wagon and truck loaders, and illustrations of the various uses to which these loaders may be put. The loaders are designed to handle coal, coke, stone, sand and similar loose materials.

Quality Gas Ranges.—Roberts and Mander Stove Company. This catalogue illustrates and describes the "Quality" line of domestic gas ranges, combination ranges, water heaters, cooking appliances for domestic science work, diet work, etc., hotel and restaurant ranges, broilers and gas heaters. Several attractive short cabinet ranges are shown.

Vulcan Stoves.—Wm. M. Crane and Company have issued a number of new sheets, standard N. C. G. A. Hand Book size, illustrating and describing the Vulcan line of ranges, hotel appliances and several of the small Vulcan gas appliances.

Blowers and Exhausters.—"Sturtevant Products" is the title of general catalogue No. 195, issued by the B. F. Sturtevent Company. Illustrations and descriptions of blowers, exhausters, ventilating sets, motors, steam engines and accessories are given.

Pipe.—"Quality Pipe" is a booklet issued by the Youngstown Sheet and Tube Company. In it is given a complete description of the manufacture of pipe by this company, and the booklet is profusely illustrated with photographs of the various operations. On the last two pages are catalogued the various weights and sizes of pipe made.

Regulators and Governors.—Fulton Gas Regulators, the Chaplin-Fulton Manufacturing Company. This booklet contains a description and lists of the various types of gas pressure regulators manufactured by this company. Regulators are shown for service with both natural and artificial gas.

Blowers.—The Connersville Blower Company. A bulletin issued by this company lists several types of blowers and pumps with a brief description accompanying each illustration.

Pump Drive.—Terry Turbines, the Terry Steam Turbine Company; a book containing 64 pages in which are set forth the ad-

vantages and the limitations of the turbine driven centrifugal pump. It contains many illustrations of turbines and units of installations.

Standard Gas Range Specification.—By the National Commercial Gas Association. These specifications embody the report made at the N. C. G. A. convention by the committee on Standardization of Gas Appliance Specifications. Most manufacturers are now building ranges in accordance with these specifications, and many gas companies demand that the ranges they buy be built in accordance with them.

Standard Gas Fixture Specification.—By the National Commercial Gas Association. These embody the report at the N. C. G. A. convention by the committee on standardization of Gas Appliance Specifications. The specifications cover such parts of the fixtures as are interchangeable, the gas tubing to be used and the cocks.

Pipe Covering.—Permanent Fortifications is the title of a little booklet issued by the Armstrong Cork Company. This is a little Extra on war with heat, and contains some interesting facts regarding the value of good heat insulation.

Coal Gas Apparatus.—The Lloyd Construction Company in a little book shows some of gas works apparatus installed by them, among which are illustrated Steel Concrete Purifiers, Cast Iron Purifiers, Scrubbers, Washers, Governors and Valves.

The Household Gas-ette.—This a bi-monthly gotten out by the Meriden Gas Light Company, Meriden, Conn. By this little paper the company brings before its consumers timely gas topics which are well written up, and the goods they have for sale.

Clark Jewel Gas Stoves—George M. Clark and Company Division American Stove Company, Catalogue No. 97, 1915. In this catalogue is described and illustrated the complete line of gas stoves, water heaters and small gas appliances. Several new all-steel stoves have been added to the line. A new feature this year is the stippled enamel linings, which can be furnished where desired, and stippled all enameled steel stoves that are very attractive. On the regular cabinet stoves the oven linings are finished with a coat of baked on aluminum. The new Firefly top lighter makes a very desirable accessory.

Recording Instruments.—Bulletin No. 192, the Bristol Company, contains description of the new Bristol Long Distance Electric Transmitting and Recording System.

Illuminometer.—The Leeds Northrup Company, in a booklet they have issued on the Macbeth Illuminometer, developed by Norman Macbeth, give a complete and detailed description of this instrument, with illustrations of its various parts. The Illuminometer is an instrument generally portable or semi-portable for the measurement of illumination or brightness.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 20 cents.

1,134,114. Gas Burner. E. W. Evans, Robinson, Ill.
1,134,122. Gas Burner. G. W. Graves, Washingtonville, N. Y.
1,134,319. Compressed Gas Lamp. E. Dresler, Neukolln, Germany.
1,134,350. Lighting Device for Gas Burners. G. A. Schaetzel, St. Louis, Mo.
1,134,373. Means for Measuring and Indicating Flows. H. Crisman, Edgewood Park, Pa., assignor to Pittsburgh Meter Co.
1,134,580. Portable Gas Producer. F. Balassa, Budapest, Austria-Hungary, assignor to Societe Anonyme Hongroise de Banque et de Commerce, same place.
1,134,604. Fluid Meter. P. Gaeth, Cleveland, O., assignor of one-third to W. F. Tausch and one-third to T. S. Jackman, same place,
1,134,628. Gas Burner. E. D. Lovekin, Philadelphia, Pa.
1,134,683. Oven for Generating Gas and Producing Coke. H. Koppers, Essen-on-the-Ruhr: Germany, assignor to H. Koppers Company, Chicago, Ill.
1,134,754. Means for Controlling the Air Supply to Water Gas Generators. L. C. Loewenstein, Lynn, Mass., assignor to General Electric Company.
1,134,768. Method in the Calorimetry of Gaseous Fuels. H. F. Smith, Lexington O.
1,134,932. Automatic Gas Cock. A. R. Weaver, Alameda, Cal.
1,134,935. Gas Lamp. C. D. Wright, Adrian, Mich.

New Methods and Appliances.

A NEW FIRST AID KIT.—The United Gas Improvement Company is making and selling this First Aid Belt, carrying in handy form all the necessary remedies for preliminary treatment of asphyxia-

tion cases. The idea was worked out by Mr. J. S. Parker, superintendent of the Frankford District Philadelphia Gas Works, and Mr. H. B. Christy, foreman fitter.

PRE-PAYMENT ELECTRIC METERS IN HOLLAND.—In the bulletin of the Society of Dutch Engineers, Heer Lulofs, Director of the Amsterdam Municipal Electric Works, has an article on pre-payment meters for electricity. The municipal authorities in Dutch towns are generally pushing electricity and these meters in Amsterdam are being placed in workmen's cottages and rented premises, including flats renting at $20 a month. The prices per unit for current are 6 cents for lighting and 4 cents for power, and through pre-pay meters, 7 cents and 4 cents respectively. One meter handles all the current through coils wound on two bobbins. The lighting current must pass both; but the power current, on a separate circuit, flows through but one bobbin, and in this way the power current is translated into lighting units, and these are registered. There are three kinds of meters used, for halfpence, 10 cent pieces, and guilders, 40 cents.

A special feature of the scheme is that the electric works does not put in house installations, and the consumer has nothing to do with the transaction. Private firms carry out the work, and are paid out of municipal funds, and their canvassers go from house to house soliciting new consumers. In order to prevent use of power current for lighting purposes, the power switches are of special construction, and are sold only at the electric works to consumers who have motors or heating devices.

A pre-pay meter installation is limited to eight outlets, and the minimum consumption per annum has to amount to 10 guilders for 4 outlets, and one guilder more for each additional outlet. The cost of installation is about $50 and produces an average yearly revenue of about $16. Calculations show that a workman will have an average yearly consumption of 100 units of electricty, and that consumers of the better class use 475 units a year.

ELECTROLYTIC IRON.—Electrolytic iron is manufactured in France to compete with Swedish iron, and is also used for seamless tubes. Using any pig iron in solution, it is possible to get a product containing $\frac{1}{8}$ as much carbon, $\frac{1}{4}$ as much silica, and $\frac{1}{8}$ as much phosphorus as in ordinary malleable iron. It has excellent electric and magnetic properties, and is well adapted for motors and transformers, as weight can be reduced and the capacity increased. Under European conditions the cost varies from $29 to $37 per ton, depending on the cost of pig iron and current.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE Boosters Club, composed of employees of the Gloucester (Mass.) Gas Light Company, held its monthly meeting recently at the office of the company. An interesting talk on the manufacture of gas was given by George A. Alden, Superintendent of the Duncan street works. After the talk the entertainment committee served a tempting lunch. William Gould, Commercial Manager of the Gas and Electric Improvement Company, was the guest of the evening, and gave a short talk for the good of the service. During the evening, James O'Neil, the comedian of the gas company, entertained the club with dances and monologues.

THE third Edison benzol recovery plant is being built in connection with the by-product coke plant of the Woodward Iron Company, Woodward, Ala. It will have a capacity of 2,000 gallons per day, and will be ready to operate about May 15. This makes a total of 8 benzol recovery plants in process of construction at iron and steel works in this country.

EMPLOYEES of the Brockton (Mass.) Gas Light Company have completed changing over the pre-payment meters in Bridgewater, to make a drop in price from $1.25 to $1.20 per 1,000 cubic feet. The reduction is in accordance with the contract made with the selectmen of the town.

THE Philadelphia Bureau of Lighting is advertising for furnishing gasoline lights in 1916, bids to be received April 23. Last year proposals were received in June and Director Cooke has advertised early in the hope that competition would appear. The Welsbach Street Lighting Company holds the contract at $29 a lamp for maintenance and $7.50 for each new post and lamp erected. This year's contract calls for the maintenance of 19,266 lamps, at a minimum light of 50-candle power. The mayor has urged Councils repetedly to authorize the transfer of 11,000 of these gasoline lights to gas, showing the willingness of the United Gas Improvement Company to expend $400,000 in extending its mains. The Mayor says the city will save $70,000 a year by such a transfer.

MR. C. F. MATHEWSON, who was chief counsel for the Consolidated Gas Company, New York, in its 80-cent gas rate case and represented it in all important legal matters, died suddenly at his residence in New York city on March 24th. He was a native of Barton, Vt., and a graduate of Dartmouth College.

NORWALK, CONN., papers carry this notice: "The new gas inspector will soon make his appearance on the East Side, and every housewife should be ready for him with the list of anything in the gas line that requires attention or adjustment. He will visit every home using gas and there will be no charge for services rendered. The institution of this free inspection service is a progressive move on the part of the United Electric Light and Water Company, and will doubtless be greatly appreciated by users of gas."

THE Mauch Chunk (Pa.) Gas Company, of which Mr. Eugene Causbrook is superintendent, is increasing the capacity of its plant. One of its gas holders is being removed and it will be replaced by one of a much larger capacity.

THE "Journal of the Imperial Gas Association" (Japan) reports: "On the 16th ult. Committee for a Calorific Standard of Gas of the Imperial Gas Association met in its office in order to discuss the calorific standard. At the last meeting they inclined to adopt a net calory, but this time they propose to alter it to a gross calory, and to set the standard at 550 B. T. U. per cubic foot, allowing 10% decrease, but, in any case, not less than this minmum (495 B. T. U.) at a test in any 3 consecutive days."

THE contract for the laying of gas mains for the Empire Gas and Electric Company has been awarded to the J. W. Brennan Construction Company of Geneva, N. Y., and the work will be begun at once. The new line will extend from the holder at the corner of Railroad place and Wadsworth street to the south line of West street, in High street.

OFFICIALS of the Portland (Ore.) Gas and Coke Company and the Pacific Power and Light Company have been in New York for their annual conference with Eastern officials of the two concerns. In the party are: Guy W. Talbot, President; W. W. Cotton, Attorney; Hilmer Papst, General Manager, and E. L. Hall, Chief Engineer. Needed improvements in the gas distributing system of Portland were discussed, and if the funds are available it is probable that some extension work will be authorized.

AT the annual meeting of the directors of the Cohoes (N. Y.) Gas Light Company these officers were chosen: President and Treasurer, Lorenzo Semple, New York; Secretary and General Manager, William P. Parsons, Cohoes.

C. RODMAN STULL, who has been General Manager of the Waukesha (Wis.) Gas and Electric Company since the resignation of H. M. Buck, 15 months ago, will retire from the position this month and return to the East, where he has been advanced by the American Gas Company of Philadelphia. His successor has not been named.

A DELAWARE charter has been granted to the Colon Gas Company, capitalized at $250,000, to operate a gas plant in Colon, Panama. The incorporators are Paul R. Loflan, A. Lloyd Glenn, and M. T. Reed, of Philadelphia.

SUBSTANTIAL reductions in the rates charged by the Albany Southern Railroad in Rensselaer and Hudson, N. Y., for gas and electricity are announced by General Manager James E. Hewes. Gas will be reduced from $1.50 to $1.25 per 1,000 cubic feet, and for electricity from 12 cents to 10 cents a kilowatt hour. The new rates become effective June 30 next and are in line with a promise made by General Manager Hewes, that with the increase in the number of consumers would come a liberal reduction in the gas and electric rates. This means much to the consumers and indicates the good faith of the company.

THE Detroit (Mich.) City Cas Company will erect a new 6-story building on a site at the southeast corner of Bagley avenue and Clifford street. The cost of the new site is $250,000. The Central Savings bank is negotiating for a 20-year lease of the present building occupied by the gas company at Washington boulevard and Clifford street. The amount of the lease for the entire term will be about $700,000.

AT the hearing by the Richmond, Va., Administrative Board of the petition of the Southern Gas and Electric Company to refer to the people the question of leasing the gas works, Commissioner McCarthy said he was willing to make three counter propositions. They were:

Pay the city $1,000,000 cash for the present sewer system and 30-year franchise, to continue the system on the terms the city prescribes—agreeing to build all necessary sewers within the corporate limits.

Take over gas works lease for 30 years, on the terms proposed by Southern Gas Company excepting the return of money expended—agreeing to spend a million dollars on improvements without any return.

Take over gas works, water works, sewer system and electric plant absolutely, with franchise to operate as city now does, and in return pay the entire city bonded debt as fast as and upon the production of the bonds.

These propositions were not considered seriously by the board and were not entered in the records of the board.

MARCH 29th was the birthday of Mr. Frank W Frueauff, President of the Denver Gas and Electric Light Company, and also the birthday of his second child, a 10-pound girl, newly arrived. Mr. Frueauff lived in Denver, but has made his home in Garden City, L. I., for the last three years. He went to Denver to attend to business early in March and to join his wife who had preceded him there. Mrs. Frueauff is a Denver woman, daughter of Mrs. Minnie B. Hall-Murphy. Theit first child, Margaret Hall, is now two years old and was also born in Denver.

MR. A. M. BARNES, President of the Cambridge (Mass.) Gas Light Company, in company with Mrs. Barnes, has just returned from a ten days' trip to Lakewood.

AS soon as a number of small matters can be straighted out the City Commission of Dayton, O., will ask for bids for furnishing

gas lighting for streets equipped for this kind of illumination. The gas is now being furnished by the Dayton Gas Company under a temporary agreement. The contract given to the Denver Gas Company over a year ago has been held invalid by the Supreme Court because it did not correctly specify the number of light posts owned by the city and by the company itself. It is possible that the city may purchase the posts owned by the gas company or place them in a certain well-defined area in order to avoid falling into the same legal error.

AT the meeting of the Bismarck, N. D., City Commissioners, a letter was read from Frank E. Ployhar of Valley City, who recently turned down the gas franchise, as ammended by the Commissioners, in which he indicated these changes as necessary to its acceptance: In Section 5 strike out the provision as to the kind of pipe to be used and the size of same. Mr. Ployhar indicates that he would use steel pipe. In Section 3 change the date on which work is to be commenced from July 1, 1915, to May 1, 1916,; the date for the completion of the plant to remain as now, Nov. 1, 1916. In Section 9, strike out the requirement of 600 B. T. U. and substitute 550 B. T. U. Also strike out all reference to pressure required. Strike out all of Section 15 which would give the city power to purchase the plant in 12½ years at its physical valuation.

MR. F. A. GOODWIN, for the past 9 years Superintendent of the gas works of the Northampton (Mass.) Gas and Electric Company, has left the employ of the company. His successor is G. B. Lawrence, Chief Electrician, who will combine the work with his present duties. The recent cut in the price of gas ordered by the Gas and Electric Commission, necessitates curtailment of expenses. Mr. Goodwin has not made any definite plans for the future and will take a much needed rest. Thursday evening he was called to the gas works and found assembled the employees who have worked under him. Each expressed regret at his leaving and to further show their appreciation they presented him with a handsome gold watch and chain.

THE Seashore Gas Company of Sea Isle City, N. J., has been chartered with an authorized capital stock of $50,000. The incorporation of the company grew out of the proceedings instituted in the Court of Chancery by Augustus H. Vautier, against the Standard Gas Company of South Jersey, under which Melbourne F. Middleton, Jr., was appointed receiver. Under an order of the court the receiver was directed to sell the plant of the Standard Gas Company to Thomas F. Reilly, of Philadelphia, for $8,500. The other incorporators, in addition to Mr. Reilly, are George Anderson, John J. Buoy and Harry Rohner of Philadelphia, and Percy J. Wall of Sea Isle City.

To increase the efficiency of its already very efficient gas plant, the Tampa (Fla.) Gas Company has contracted for the installation of a U. G. I. duplex waste heat boiler, in connection with its water gas plant. The boiler will utilize the heat of both the blast and illuminating gases from the generating apparatus, and make all the steam required for manufacture of the gas. When the installation is completed the Tampa company will have one of the most modern plants in the South.

AFTER nearly two years legislation a decision of the Supreme Court of California has been given in the case of Hanford City vs. the Hanford Gas and Power Company. The decision is against the gas company and means that the corporation will have to pay into the city treasury 2% of its gross annual receipts. It is estimated that the city will receive about $40,000 during the life of the company's franchise.

IN January, 1915, the Pacific Gas and Electric Company made a net gain of 2,775 consumers. In February the gain was 2,983, a total net gain for the 2 months of 5,758. This compares with 2,404 consumers gained in the first 2 months of last year. The following table shows the number of consumers in each department served February 28, 1915, compared with February 28, 1914.

February 28 –	1914.	1915	Gain.
Electric	134,252	152,233	17,981
Gas	208,961	222,036	13,075
Water	8,428	9,045	617
Steam	297	353	67
	351,938	383,667	51.729

UTILITIES COMMISSION NEWS.

THE WYOMING COMMISSION.—The commission has been organized. It is composed of Governor John B. Hendrick, State Auditor Robert B. Forsyth and State Treasurer H. B. Gates. Mr. H. Allen Floyd has been appointed secretary.

WESTCHESTER COUNTY, N. Y., RATES.—The up-state New York Commission has approved the reduction of rates for gas and electricity affecting Port Chester and other Westchester county communities that have been waging a long fight to that end, as agreed on between the representatives of the cities and villages affected, and the Westchester Lighting Company.

The reduction in the price of gas is in the shape of a sliding scale which will in three years reduce the price of gas in villages to $1.25 per 1,000 feet. In places where gas is selling for $1.50 a reduction of 5 cents the first year and 10 cents the next succeeding two will be made.

In Mount Vernon and New Rochelle, the rate for electricity has been 13 cents a kilowatt. The price will now be 12 cents. In White Plains and other villages, where the price has been 15 cents, the reduction to 12 has also been made.

All these rates will go in effect as of May 1st.

CAPITAL TO REPRESENT ASSETS.—Gas and electric corporations in Maryland have no right to capitalize earnings since April 1, 1914, according to an opinion of counsel submitted to the Public Service Commission. Under the law passed by the last Legislature such companies have a right to capitalize earnings expended prior to April 1, 1914, to the extent only that the property of the corporation has been enhanced by such expenditure. However, the value of the property which has absorbed the earnings proposed to be capitalized cannot be ignored, and any appreciation or depreciation thereof at the time the application is made should be taken into consideration.

If, for any reason, the property of the corporation has not been enhanced in value by the expenditure of the earnings to the extent of the par value of the stock proposed to be distributed as a dividend, the issuance of such stock dividend is irregular and improper.

Every dollar of stock issued as a dividend by a corporation must be represented at the time of its issuance by a dollar's worth of property added to the corpus of the corporate assets.

INSIST ON ACCIDENT INSURANCE.—The Wisconsin Commission has granted the application of the Brodhead municipal electric light plant for an increase in revenues; and in determining the cost of service to be used as a basis for rates, the commission disallowed certain expenditures which were the result of casualties and accidents, holding that these contingent expenditures should have been provided for by proper insurance and that consumers could not be penalized for lack of foresight in the management by being forced to pay increased rates.

CALIFORNIA SECURITIES AUTHORIZED IN 1914.—The California Railway Commission during 1914 authorized the issuing of $226,725,502 securities; $48,469,780, or 21.38% of which were for gas and electric companies, and $182,345, or 0.80% for telephone and telegraph companies. The larger part, $138,744,183, or 61.20 per cent., were for steam railroads. The purposes for which they were authorized were: New construction, 57.85%; refunding, 37.01%; collateral, 3.96%; miscellaneous, 1.18%.

ST. JOSEPH, MO., CASE.—The engineering force of the Missouri Public Service Commission has completed the valuing of the physical property of the St. Joseph Gas Company, which is to be used as a basis for fixing rates for both natural and manufactured gas.

DOES NOT FAVOR HOLDING COMPANIES.—Governor Alexander of Idaho has called upon the Attorney General and Public Utilities Commission to investigate the alleged consolidation of rival Southern Idaho hydroelectric power companies into the National Securities Company, a subsidiary of the Electric Bond and Share Company of New York, which is to become the holding company. The consolidation includes the Idaho-Oregon Light and Power Company, the Idaho Railway, Light and Power Company and the Idaho Power and Light Company, rivals in the Western Idaho field; the Great Shoshone and Twin Falls Waterpower Company in the Twin Falls field and the Southern Idaho Waterpower Company in the Pocatello field. The Governor declares that "holding companies are detrimental to the best interests of the State."

Financial Notes.

EARNINGS of the PEOPLE'S GAS LIGHT AND COKE COMPANY for the quarter ending with March show substantial improvement compared with the final quarter in 1914, and a normal gain over the corresponding period last year. Purchases of the shares in the last week, while small, have been largely of an investment character. The company has a larger number of stockholders than ever before.

THE WESTERN STATES GAS AND ELECTRIC COMPANY for the year ending December 31 reports gross earnings $1,117,867: net $523,828; bond interest, etc., $275,600; surplus for dividends, $248,228, compared with surplus of $229,615 in 1913.

EARNINGS of the BROOKLYN UNION GAS COMPANY for the year ended Dec. 31, 1914, compare as follows:

	1914.	1913.	Increase.
Operating revenue	$10,730,812	$9,918,514	$812,297
Net after taxes	1,918,896	1,596,446	322,450
Other income	208,292	205,074	3,218
Total income	2,127,189	1,801,521	325,668
Interest and rent	831,806	825,557	6,249
Surplus	1,295,381	975,961	319,420
Dividends	1,439,920	1,439,920	.....
Deficit	144,539	463,958	*319,419
Prev. surplus	5,981,293	6,294,343	*313,050
Adj. credit	105,823	150,907	*45,094
P. and L. surplus	5,941,578	5,981,293	*38,715

*Decrease.

THE UNITED GAS AND ELECTRIC CORPORATION subsidiaries report for the year ended December 31, 1914, as follows:

	1914.	1913.
Gross	$14,013:353	$13,638,343
Operating expenses	6,083.161	5,972,889
Net	7,930,192	1,655:454
Maintenance and taxes	2,062,223	1,972,961
Net income	5,867,969	5,682,593
Fixed charges	3,459,238	3,308,261
Surplus	2,408,731	2,375,232
Reserve	486,826	387,700
Surplus	1,921,905	1,986,582
P. and I. surplus	4,688,066	4,041,331

THE AMERICAN POWER AND LIGHT COMPANY, which controls the Kansas Gas and Electric, the Pacific Power and Light, the Portland Gas and Coke, and the Southwestern Utilities Corporation, has published its 1914 statement:

Gross earnings		$1,461,580
Expenses		387,526
Net earnings		$1,074,054
Interest and discounts		534,552
Net income		$539,502
Combined net surplus of controlled companies, after payment of dividends	$234,621	
Transferred to reserve for depreciation	185,908	
Balance undistributed surplus	$48,713	
Less amount accruing to common stock not owned by company	4,553	
Balance accruing to company		44,160
Total net income, 1914		$583,662
Less preferred stock dividends paid		187,188
Balance		$396,474
Less common stock dividends paid		302,476
Balance combined surplus year ended Dec. 31, 1914		$ 93,998
Surplus American Power and Light Co., Dec. 31, 1913		276,698
Surplus Dec. 31, 1913, of controlled companies	$964,899	
Less amount accruing to common stock not owned by company	10,433	
Balance surplus		$954,466
Balance combined surplus Dec. 31, 1914		$1,325,162

ANNUAL MEETING.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
N. W. CORNER BROAD AND ARCH STS.,
PHILADELPHIA, PA., April 15, 1915.

The Annual Meeting of the Stockholders of The United Gas Improvement Company will be held at the office of the Company, Northwest Corner of BROAD AND ARCH STREETS PHILADELPHIA, on Monday, May 3, 1915, at 12 o'clock, noon, when an election will be held for a President and six (6) Directors to serve for the ensuing year, and such other business transacted as may be brought before the meeting. The stock transfer books will be closed from 3 P.M., Wednesday, April 21, 1915, until 10 A.M., Tuesday, May 4, 1915.

2080-2 G. W. CURRAN, Secretary.

CONTENTS.

AN ASTERISK (*) DENOTES AN ILLUSTRATED ARTICLE.

*THE ST. PETERSBURG, FLORIDA, GAS PLANT 241

ELECTRIC COOKING IN APARTMENT HOUSES 242

*LEAD WOOL AS JOINTING MATERIAL, by C. E. Reinicker. 242

WAR PRICES FOR GAS 246

MAINTENANCE OF HOUSE BURNERS, by Mr. H. C. Crafts. 247

EDITORIALS 248
D. R. Russell Dead—Electric Cooking—A Check on Enterprise—"The Old Guard"—Illuminating Engineering Society.

SEVENTH ANNUAL MEETING, PENNSYLVANIA GAS ASSOCIATION—And Joint Meeting of New Jersey State Gas Association—[Special Editorial Report] 249

*PUMPING WATER BY COMPRESSED AIR, by G. C. Thompson 251

COAL SUPPLIES FOR ENGLISH GAS WORKS 252

Publications 252

Recent Patent Issues 253

NEW METHODS AND APPLIANCES 253
*A New First Aid Kit—Pre-payment Electric Meters in Holland—Electrolytic Iron.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES 254
Gloucester, Mass., Boosters Club—Benzol Plants—Changing Wheels—Still Using Gasoline Lamps—Mr. Mathewson Dead—Norwalk Maintenance—New Holder at Mauch Chunk—Japanese Standard—Contract for Geneva Mains—Portland to New York—Cohoes, N. Y., Officers—Mr. Stull Comes East—Gas for Colon—Rensselaer and Hudson, N. Y., Reductions—Detroit to Build—More Propositions for Richmond—Busy in Denver—Mr. Barnes Home Again—Re-advertising for Lighting—Bismarck Franchise Amendments—Mr. Goodwin Wins Good Will—Seashore Gas Company—Tampa Wastes Nothing—Hanford Company Must Pay—Pacific Gas and Electric Gains in Consumers—And Other Items.

UTILITIES COMMISSION NEWS 255
The Wyoming Commission—Westchester County, N. Y., Rates—Capital to Represent Assets—Insist on Accident Insurance—California Securities Authorized in 1914—St. Joseph, Mo., Case—Does Not Favor Holding Companies.

Financial Notes 256

Public Lighting Table for April, 1915 (Ad. Section) 7

Meeting Times of the Various Gas Associations (Advertising Section) 21